Natural Resources Canada
Ressources naturelles Canada

The State of Canada's Forests

Annual Report 2016

Canada

Natural Resources Canada
Ressources naturelles Canada

The State of Canada's Forests

Annual Report 2016

Canada

Library and Archives Canada Cataloguing in Publication

Main entry under title: The State of Canada's Forests: Annual Report 2016.
Annual.
Description based on 1991-
Aussi disponible en français sous le titre : L'État des forêts au Canada : rapport annuel 2016.
Bibliographic address varies: 1993- , Canadian Forest Service.
Issued also on the Internet. Subtitle varies.

Cat. No. Fo1-6E (Print)
ISSN 1196-1589
Cat. No. Fo1-6E-PDF (Online)
ISSN 1488-2736

1. Forests and forestry—Canada—Periodicals.
2. Forest policy—Canada—Periodicals.
I. Canada. Forestry Canada.
II. Canadian Forest Service.

SD13.S72
634.9'0871'05

Copies of this publication may be obtained from cfs.nrcan.gc.ca/stateoftheforests.

Information contained in this publication or product may be reproduced, in part or in whole, and by any means, for personal or public non-commercial purposes, without charge or further permission, unless otherwise specified.

You are asked to:

- exercise due diligence in ensuring the accuracy of the materials reproduced;
- indicate the complete title of the materials reproduced, and the name of the author organization; and
- indicate that the reproduction is a copy of an official work that is published by Natural Resources Canada (NRCan) and that the reproduction has not been produced in affiliation with, or with the endorsement of, NRCan.

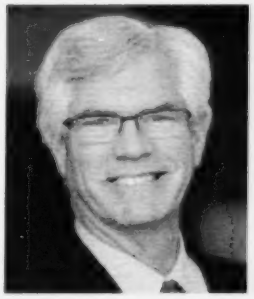
Commercial reproduction and distribution is prohibited except with written permission from NRCan. For more information, contact NRCan at nrcan.copyrightdroitdauteur.rncan@canada.ca.

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2016

Table of contents

Message from the Minister of Natural Resources 3
At a glance: Canada's forests by numbers 4
Canada's forests in a changing climate 6
Taking wood buildings to new heights 14
5 reasons why wood is one of Canada's most valuable resources 15
Helping Canada's urban forests adapt to climate change 16
Sustainability indicators 17
How much forest does Canada have? 18
Indicator: Forest area 19
Indicator: Deforestation and afforestation 20
Indicator: Wood volume 21
Is timber being harvested sustainably? 22
Indicator: Area harvested 23
Indicator: Regeneration 24
Indicator: Volume harvested relative to the sustainable wood supply 25
How does disturbance shape Canada's forests? 26
Indicator: Forest diseases 27
Indicator: Forest insects 28
Indicator: Forest fires 30
Indicator: Carbon emissions and removals 32
Spotlight: Assisted migration as a climate change adaptation tool 33
How do forests benefit Canadians? 34
Indicator: Employment 35
Indicator: Average earnings 36
Indicator: Communities 37
Spotlight: Bioenergy in Indigenous communities 38
How does the forest industry contribute to the economy? 40
Indicator: Gross domestic product 41
Indicator: Production 42
Indicator: Exports 43
How is the forest industry changing? 44
Indicator: Financial performance 45
Indicator: Secondary manufacturing 46
Indicator: Forest industry carbon emissions 47
Statistical profiles 48
Sources and information 56

Message from the Minister of Natural Resources



It is my pleasure to present *The State of Canada's Forests: Annual Report 2016*. This report describes the current status of a renewable resource that is vital to the economic, social and cultural health of communities across Canada.

Canadians can be proud of our forest sector, which is one of the world's leaders in sustainable forest management. Canada has nearly 9% of the world's forests of which less than 0.3% are harvested annually. Our forests have always presented Canada with enormous potential, and this will continue to be the case as we face a changing climate. Indeed, there can be no solution to climate change that does not include Canada's forests and forest sector. This edition of *The State of Canada's Forests* is dedicated to the subject of climate change.

My department is playing an active role to support the commitment Canada made in December 2015 during the climate change conference in Paris. Natural Resources Canada's scientists have been monitoring and researching the environmental, economic and social impacts of climate change on Canada's forests and forest sector. Their research is providing a better understanding of how climate change could affect Canada's forests and providing authoritative data that will help the forest sector adapt to changing circumstances and mitigate the impacts of climate change.

Using wood waste for energy and wood in the construction of tall buildings are examples of how the forest sector can help reduce greenhouse gas emissions. As well, informed decisions about the species of trees to be used during replanting could help create more resilient forests that are more adaptable to the effects of climate change. Through innovation, Natural Resources Canada is collaborating with the forest sector and the provinces and territories to ensure our forests continue to be both a source of economic growth and one of the solutions to climate change.

During the Fort McMurray wildfires, all levels of government worked collaboratively. My department supported firefighting efforts by using remote sensing data and fire behaviour modelling to produce forecasts that federal and provincial emergency management agencies used to project potential fire growth and to help allocate fire-fighting resources. With these events still fresh in our minds, adopting best practices such as the FireSmart program will ensure our communities are less susceptible to the destructive forces of wildfires in the future.

We will continue to work in partnership with provinces and territories to mitigate the risk of wildland fires. In June, as a member of the Canadian Council of Forest Ministers, the Government of Canada and provincial and territorial governments reaffirmed their commitments to wildland fire prevention, mitigation, preparedness and suppression through the *Canadian Wildland Fire Strategy: A 10-Year Review and Renewed Call to Action*.

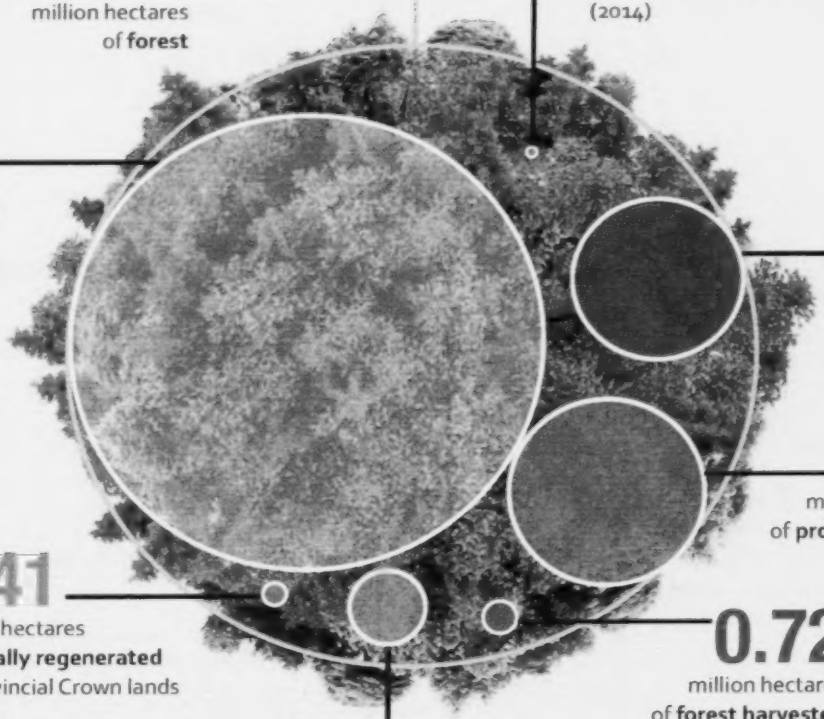
As a renewable resource, Canada's sustainably managed forests will continue to provide Canadians with economic prosperity and environmental solutions. And, through innovation and science, I am confident our forest sector will continue to adapt to meet ever-changing global demands.

The Honourable Jim Carr, P.C., M.P.,
Minister of Natural Resources

At a glance:

Canada's forests by numbers

Canada has



347 million hectares of **forest**

0.03 million hectares of **forest deforested** (2014)

166 million hectares of forest **independently certified as sustainably managed** (2015)

20.3 million hectares of forest **damaged by insects** (2014)

24 million hectares of **protected forest**

0.41 million hectares **artificially regenerated** on provincial Crown lands (2014)

0.72 million hectares of **forest harvested** (2014)

3.9 million hectares of forest **burned in forest fires** (2015)

WORLD FORESTS

Canada has the **third-largest forest area in the world.**

1st RUSSIA
2nd BRAZIL
3rd CANADA
4th USA
5th CHINA

PUBLIC LAND

All public lands
harvested must be regenerated.

Over **540 million seedlings**
planted in 2014

GROSS DOMESTIC PRODUCT

$22.1 billion
from the forest industry
in 2015

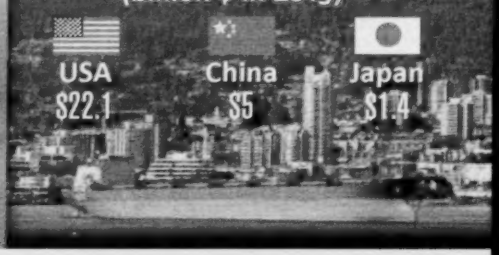
FOREST INDUSTRY EMPLOYMENT

201,645 jobs
including
9,500 jobs
in **Indigenous communities**
in 2015

EXPORTS

Nearly 7% of all Canadian exports are from the **forest industry.**

top 3 forest product **export destinations (billion $ in 2015)**



GREENHOUSE GAS EMISSIONS

The forest industry reduced direct carbon emissions by
44%
by substantially cutting fossil fuel use between 2000 and 2013.

Forests remove
1/4
of **all emissions from fossil fuel**
use every year.

Bioenergy from **forest biomass** produces
42% to 52%
less greenhouse gas emissions than is produced by energy from traditional fossil fuels.

Canada's forests in a changing climate

The climate is changing and so are Canada's forests. Increased numbers of large fires, greater drought frequency and intensity, shifting patterns of disease and invasive insect outbreaks: all of these trends over the last five decades are impacting Canada's forests and have even resulted at times in loss of jobs and homes in some communities.

How the climate will continue changing is difficult to predict. But because Canada is a northern country, the changes are expected to be greater than the global average. How Canada's forests will respond is also hard to know. However, scientists and other researchers are working to find answers that will reduce these uncertainties.

If global efforts to address climate change are successful in limiting the world's increase in temperature to 2°C, the increase in Canada is still forecast to average 4°C by 2100.

With the likelihood of new climate conditions, forests are expected to evolve, and in some areas become quite different from what they are now. Species composition, average age, geographic range and growth rates are all likely to change over the coming decades. This makes adaptation by the forest sector – such as planting drought-tolerant species – more important than ever.

At the same time as they are affected by climate change, forests can also be part of mitigating (reducing) it. Trees absorb carbon dioxide (CO_2) from the atmosphere and store it in their trunks, roots, branches and leaves. Increasing the area and growth of forests therefore reduces the amounts of greenhouse gases (GHG) in the atmosphere, helping to slow temperature rise. Using wood products and bioenergy also helps lessen the need for products made with processes that result in high GHG emissions and reduces the use of fossil fuels.

What effect is climate change having on Canada's forests?

Canada's scientists have long been studying how changing climate conditions are affecting the country's forests. Among the most notable impacts observed:

- Milder, drier climatic conditions over the past 50 years are thought to be a major reason for longer fire seasons and the increase in the number of severe forest fires and the size of areas burned.

- In the 2000s, a series of warmer-than-usual winters enabled the mountain pine beetle to flourish and spread across much of central British Columbia. The outbreak killed more than 750 million cubic metres of mature lodgepole pine – a loss of more than 10 years' worth of the province's annual harvest. Researchers report that the beetle, now in north-central Alberta, the Northwest Territories and Saskatchewan (well beyond its natural historical range), may continue spreading east in the coming decades. It has already moved into new tree host species.
- The current spruce budworm outbreak in the Mackenzie River delta in the Northwest Territories is taking place at the highest latitude ever recorded for such an infestation.
- The increase in the rate of premature death of healthy trees in many forest types over the past few decades is likely the result of drought-related or other climate-triggered outbreaks of insects in weakened forests. Drought conditions have also contributed to the death or stunted growth of trees in several parts of Canada, including white spruce in Yukon (from spruce bark beetle infestation) and aspen in Alberta, Saskatchewan and Ontario.

Science points to the changes in the world's climate being the result of greater GHG emissions, including CO_2, from human activities such as heavy reliance on fossil fuels, industrial production processes and global deforestation.

How forests could look in the future

Research on the biological, economic and social implications of climate change for Canada's forests and forest industry is constantly improving our understanding of what the potential changes might be and how they could affect forest habitat and biodiversity, timber supply and communities.

Most areas in Canada, for example, are expected to experience at least a twofold increase in annual area burned by forest fires and a 1.5-fold increase in the number of large fires by the end of the 21st century. This means that the average age of the country's forests is likely to decline in some areas, with increases in the number of young trees regenerating in burned-out areas.

Forest growth rates and the distribution of species may change gradually, too. Climate conditions have already shifted, affecting the distribution of certain tree species in Canada. The rate of climate change is projected to be 10 to 100 times faster than the ability of tree species to migrate. This means that some tree species will benefit (for example, growing faster or spreading more widely), while others will become increasingly stressed, potentially dying out over time.

Such changes pose broader ecological consequences as well, affecting vegetation and wildlife, which would need to adapt or migrate under changing climate and forest habitat conditions.

Given Canada's vast and generally remote forests, measuring, monitoring and tracking the changes in them is challenging. The National Forest Inventory (NFI) is an important tool for tracking or monitoring current and projected changes in the forest. It will also become increasingly important as a means of providing early warning of climate change impacts and tracking ongoing change in our forests.

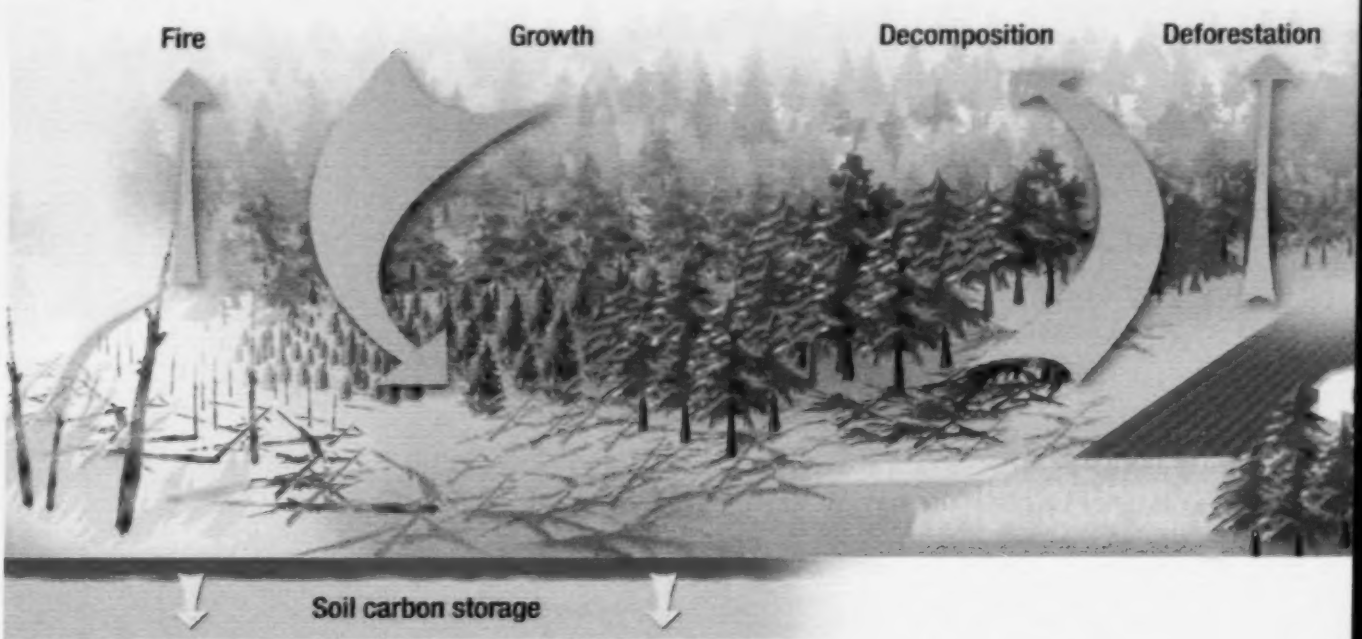
Forest sector adaptation to climate change is needed

Adapting to climate change means adjusting decisions and activities to take into account observed or expected changes in climate. In the forest sector, that means integrating climate change knowledge into sustainable forest management planning and practices to help maintain both ecosystem integrity and the flow of social, economic and environmental benefits. Planting a greater diversity of tree species in a forest, for example, is one way of reducing the forest's vulnerability to future insect infestation or fire risks.

Adaptation measures are specific to a region and forest type and therefore vary widely. What best suits the local environmental and socio-economic needs in a region on the east coast might not offer the best solution on the west coast or in the northern boreal forest. The map on page 12 shows examples of adaptation actions that can be taken.

Adaptation efforts help forest ecosystems, the industry and forest-dependent communities across Canada reduce their vulnerabity to the negative effects of climate change.

The role of forests in the carbon cycle



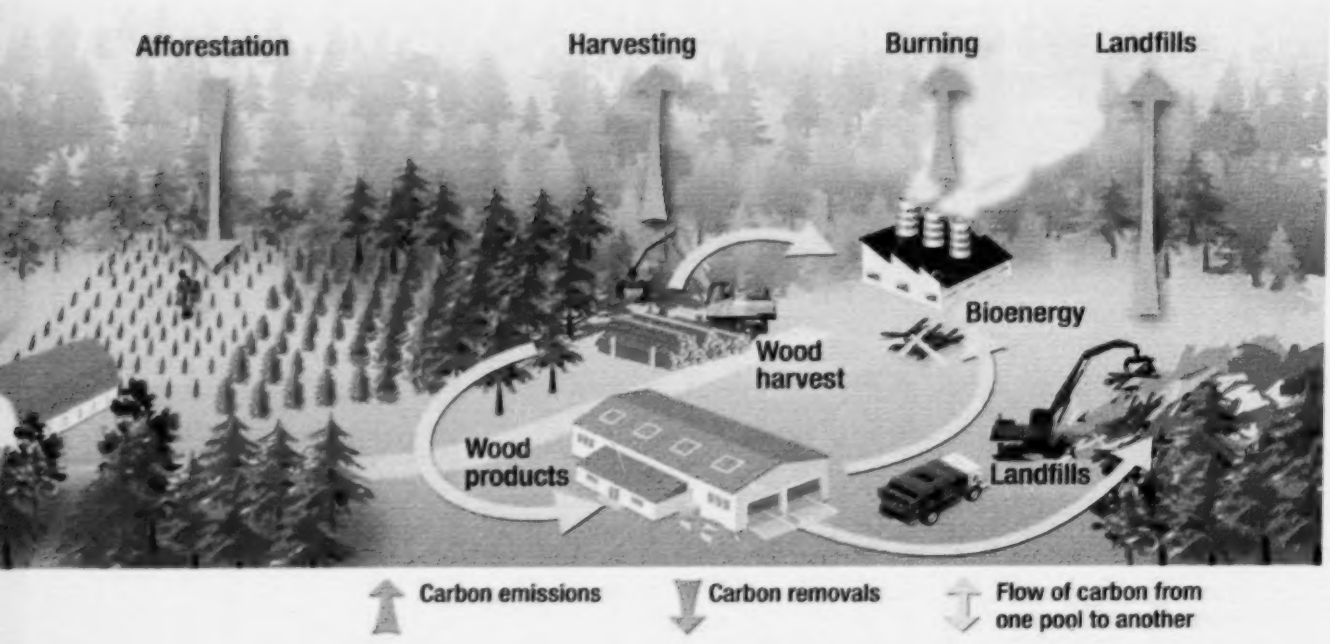
As they grow, forests absorb large amounts of carbon from the atmosphere. Other natural forest processes, such as decomposition and fire, release carbon back into the atmosphere. This dynamic process of absorbing and releasing carbon constantly affects Earth's carbon balance. How humans manage forests and use wood also affects this balance.

Adaptation will also be important to industry and communities as they adjust to the changing forests they rely on. Harvest levels, for instance, may need to be reduced as more-frequent natural disturbances reduce the available timber supply. Forest companies will need to increase their efforts to find innovative ways to use more dead or low-quality wood salvaged from burned areas or areas invaded by insects or disease. Communities located in forested areas are already being encouraged to be "fire smart" by clearing trees and general forest brush (living and dead) from areas between buildings and forest.

Since 2008, the Canadian Council of Forest Ministers (CCFM) has focused on what adaptation means for sustainable forest management. A series of the CCFM's reports offers forest managers guidance in assessing the vulnerabilities, risks and opportunities associated with climate change. Many forestry organizations are using the reports to inform policies and practices.

Forest Change, a component of the Government of Canada's adaptation program, was also launched in 2011 to support the forest sector in adapting to climate change. The program provides science-based information and analysis on past trends and future projections of climate change impacts on the forest and the forest sector. And its tools are helping forest managers and others in the sector develop and implement adaptation plans and take action to adjust to the future climate.

The "carbon cycle" is the movement of carbon from land and water through the atmosphere and all living things. Carbon in the atmosphere exists as CO_2, a GHG. Forests are an important part of the carbon cycle. Trees absorb carbon during photosynthesis and store it in their stems, branches and roots. A large proportion of this stored carbon also ends up in forest soil through natural processes such as annual leaf fall and tree death. Trees release carbon during respiration, when they die and decay, and if they are burned in a forest fire. Forests are considered to be "carbon sinks" when they absorb more carbon than they release; and "carbon sources" when they release more carbon than they absorb.



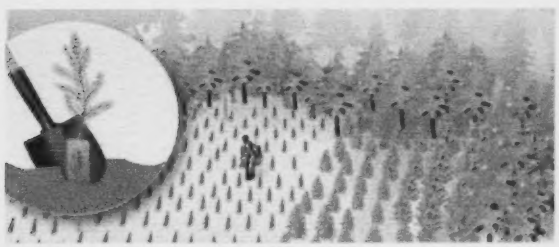
Using Canada's forests to help mitigate climate change

At the climate change conference in Paris in December 2015, Canada joined the international community in aiming to achieve near-zero GHG emissions by 2050. Canada has committed to a 30% reduction in its emissions (below 2005 levels) by 2030. Further emission reductions will be needed after that in order to meet the international ambition of keeping the global temperature increase to below 2°C.

Given the current and projected impacts of climate change on Canada's forests, it may seem counterintuitive to think that forests can also be part of the climate change solution. However, the carbon-storing capacity of forests, together with the ability of wood products to replace fossil-fuel-intensive products, can contribute to keeping CO_2 out of the atmosphere. (For more information, see the sustainability indicator on carbon emissions on page 32.)

The ways in which forests are managed (tended, harvested and regenerated) and harvested wood is used can therefore make important contributions to Canada's efforts to meet its climate change commitments. Among the mitigation actions being considered by various jurisdictions are the following:

- Increase the overall forest area – Landowners could plant new forests on lands not currently part of the managed forest.

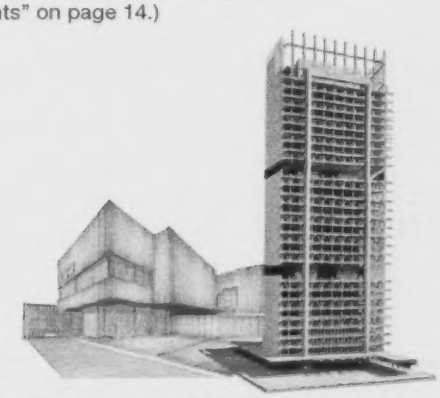


Increase the overall forest area.

- Use sustainable forest management practices that reduce GHG emissions and store carbon – Forest managers could limit on-site burning of harvest waste (such as stumps, bark and branches), using it for bioenergy instead; make more complete use of the material harvested; speed up reforestation after natural disturbances; and increase growth rates in appropriate locations through intensive management.

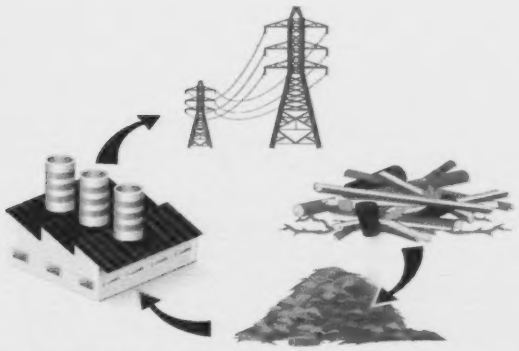
Use sustainable forest management practices that reduce GHG emissions and store carbon.

- Use more wood in construction – Builders could use more wood from sustainably managed forests in non-traditional construction applications in place of other materials whose manufacture, use and disposal involve higher amounts of GHG emissions. The practicality and environmental benefits of using wood in construction are already being demonstrated in ever larger and taller wood buildings. (See "Taking wood buildings to new heights" on page 14.)



Use more wood in construction.

- Use more wood waste for energy and other bioproducts – Industry and individuals could increase the use of waste wood for energy to replace fossil fuels or use bioproducts that replace similar products made from fossil fuels. (See "5 reasons why wood is one of Canada's most valuable resources" on page 15.)



Use more wood waste for energy and other bioproducts.

Some of the emission-reducing benefits from these activities would be immediate. Other benefits would take more time to achieve. For this reason, the sooner mitigation actions are undertaken, the more they will help Canada meet its GHG emission reduction target for 2030 and its longer-term move to a low-carbon economy.

The federal government, provinces and territories are working together to develop a pan-Canadian framework for climate change. Launched by the Prime Minister and Premiers in March 2016, the framework aims to develop and implement a plan for how Canada can achieve its 2030 climate change target.

Looking ahead to minimizing future climate change impacts

While there is no certainty about future climate or forest conditions, the impacts of current climate change on forests is evident in more frequent fires, insect and disease outbreaks, and drought. Canada's scientists are working with others around the world to equip decision-makers at all levels with knowledge and tools to better anticipate the climate challenges ahead.

An example is Canada's carbon monitoring and reporting system. It tracks how emissions are changing and is a useful tool for devising carbon mitigation strategies. Other tools, such as assisted migration and risk assessment guidelines, have also been developed. Forest managers are already using these to adjust their thinking and their management practices to support the long-term sustainability of Canada's forests. New strategies, tools and practices will continue to emerge as research adds to our knowledge of the complex relationship between forests and climate.

As a biological resource, forests are on the front line in experiencing the effects of the ongoing changes. And as a renewable resource made of carbon, they are part of the climate change solution. For both reasons, helping our forests adapt is critical for maintaining their health and for ensuring that mitigation strategies are successful.

Adapting to climate change in Canada's forests

Fire-proofing neighbourhoods and communities

As fire activity in many regions increases, communities and homeowners are conducting hazard assessments and following FireSmart recommendations – for example, selecting fire-resistant plants with moist, supple leaves for landscaping and removing potential fuel such as dry grasses and dead branches from around homes.

Planting tree species with greater drought tolerance

Drought conditions reduce tree growth and productivity and can lead to tree mortality. Researchers are studying plant traits to identify tree species with greater drought tolerance and increased ability to reproduce following drought.

Planting trees from a wider range of seed sources to maintain productivity

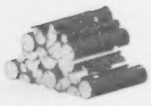
A tree planted today will mature in a warmer climate and may not grow as well in that regime. Foresters are therefore planting seedlings from a range of seed sources, favouring species from southern or lower-elevation populations – sources already adapted to warmer conditions.

Adjusting forest harvest schedules to minimize severe insect damage

As the incidence of severe insect infestations increases, foresters can adjust harvest schedules to remove vulnerable stands of trees ahead of pest attacks and harvest insect-damaged trees to maintain overall stand health.

Reducing damage to forests from wind storms

As temperatures warm, the early thaw and delayed freezing of soils provide less support for tree roots, making them more prone to uprooting during spring and fall wind storms in eastern Canada. Silviculture techniques such as varying the size and shape of harvest blocks and leaving patches can help reduce forest vulnerability to wind damage.



Finding ways to use the wood from dead and damaged trees

To offset the effects of damage to forests caused by insect and disease outbreaks, forest companies are salvage-logging and adjusting wood-processing techniques to create new products from dead and lower-quality trees.

Taking wood buildings to new heights

One way that Canada can mitigate climate change is by using construction materials made of wood from sustainably managed forests, instead of using traditional building products with greater associated greenhouse gas emissions. Innovative engineered wood-based products developed in recent years (such as mass timber) are making it possible to construct mid-rise and tall wood buildings – 6, 10 and even 18 storeys high.

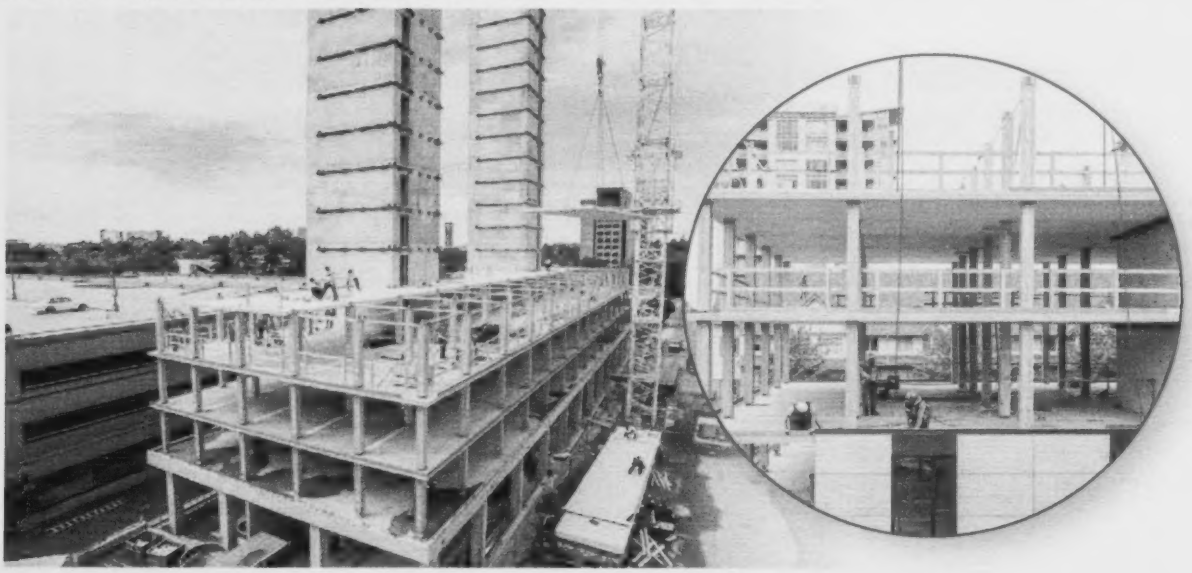
These engineered wood products have enhanced strength properties, making them equivalent in many ways to those of steel and concrete. But they take less energy to manufacture and produce fewer emissions and pollutants over the course of their life. As well, they are made from a renewable resource: not only do trees absorb carbon as they grow, and store the carbon in the wood after they are harvested, but Canada's sustainable forest management practices ensure that harvested trees are replaced.

Until 2015, the National Building Code of Canada restricted the use of wood to structures to no higher than four storeys. But extensive research and development funded by Natural Resources Canada and conducted by FPInnovations, the National Research Council and the Canadian Wood Council showed excellent performance of wood in taller buildings. As a result, the National Building Code was revised to allow for use of wood in mid-rise wood frame buildings up to six storeys high.

The ease of assembly, cost-effectiveness and environmental benefits of these innovative wood products have since sparked interest in using wood for even taller buildings of 10 storeys and higher. For example, the Government of Canada is supporting construction of an 18-storey wood building – a student residence at the University of British Columbia in Vancouver (working with the government of British Columbia and the Binational Softwood Lumber Council) – and a 13-storey mixed-occupancy wood building in Québec City (working with the government of Quebec).

Many municipal and provincial governments are trying to curb urban sprawl, and its related environmental impacts, by encouraging developers to construct taller buildings. Today, using wood products can help cities meet their urban density targets, while reducing their environmental footprint and mitigating the effects of climate change. All of which suggests that tall – even high-rise – wood buildings are a win-win solution.

The 18-storey wood building under construction at the University of British Columbia, in Vancouver.



5 reasons why wood is one of Canada's most valuable resources

When you choose wood harvested from Canadian forests, you can be assured that it comes from legally harvested, sustainably managed sources – sources where operations comply with Canada's strict laws, regulations and policies for sustainable forest management. Keeping our forests healthy and productive means that our trees can keep on giving, before and even after they're harvested. Here's how.

1. Wood, like the forests it comes from, helps reduce climate change

While trees grow, they absorb carbon from the atmosphere. Trees harvested to make long-lasting, durable wood products such as buildings and furniture store this carbon for the life of the product. This helps mitigate the effects of climate change. And new trees growing to replace those harvested continue the process, capturing carbon as they mature.

2. Building with wood is better for the environment than other materials

Using wood for building uses less energy, emits fewer greenhouse gases, and releases fewer pollutants into the air and water than using steel and concrete, both of which are energy- and resource-intensive to produce. Wood can also improve the energy efficiency of most buildings.

COMPARED TO WOOD

Steel...

- Consumes **12%** more energy
- Emits **15%** more greenhouse gases
- Releases **10%** more pollutants into the air
- Generates **300%** more water pollutants

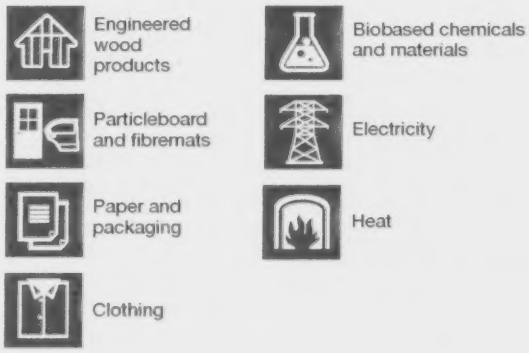
Concrete...

- Consumes **20%** more energy
- Emits **29%** more greenhouse gases
- Releases **12%** more pollutants into the air
- Generates **225%** more water pollutants

3. Wood allows us to reduce, reuse, recycle, and recover waste

Sawmilling residues such as wood chips, bark and sawdust account for 56% of the volume of wood that goes into a lumber mill for processing. Instead of being thrown out, this "waste" can be made into paper, engineered wood products, industrial chemicals, pharmaceuticals, clothing, personal care products and bioenergy. In Canada, bioenergy is primarily sourced from wood residues and sometimes from dead or damaged timber.

Sawmill residues or waste are made into



4. Innovative wood products and energy bring new green options to the economy

Today, wood and wood residues go into making bioplastics, long-lasting, hard-wearing composite materials, "green" chemicals and bioenergy – all renewable, low-carbon alternatives to conventional materials and fossil fuels. The result? Significant contributions to a cleaner, greener economy.

5. Wood helps keep small and remote communities thriving

Locally sourced timber harvesting and wood processing provide hundreds of Canada's small communities – including many Indigenous communities – with jobs, local investment in infrastructure and social programs, and opportunities for clean technology development.

Helping Canada's urban forests adapt to climate change

Urban forests improve the quality of life in cities and towns in many ways. Trees, on both public and private property, increase biodiversity by providing essential wildlife habitat. Through their natural growth systems, trees also improve air and water quality by removing pollutants from the air and reducing stormwater runoff. And trees lessen the "urban heat island" effect (warm temperatures created by human activities and city infrastructure) by adding moisture to the air and creating shade, both of which lower temperatures.

These positive impacts are linked to notable human health benefits, including reductions in stress levels, childhood obesity, and respiratory and cardiovascular illness and increases in longevity. Access to trees has even been linked to improved workplace satisfaction and job performance.

Urban forests provide many economic benefits, too. For example, they create park maintenance and planning jobs, enhance tourism, and increase property values. Trees also extend the life of municipal infrastructure by preventing erosion and flood damage, and they help reduce air conditioning and heating costs by shading homes and buildings. Studies have shown that for every $1.00 spent on urban forest maintenance, city trees provide $1.35 to $12.70 in benefits.

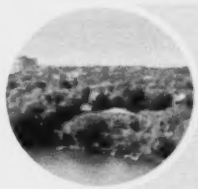
Then there is the benefit of greenhouse gas (GHG) reduction: urban forests help reduce the level of atmospheric carbon dioxide (CO_2) and other GHGs. Canada's managed forests absorb vast amounts of carbon annually – equal to the weight of about 424 CN Towers. As urban forests account for about 5% of Canada's managed forests, that means the atmospheric carbon absorbed by city trees is equal to nearly 2.5 million metric tonnes – the weight of about 21 CN Towers.

However, Canada's urban forests are being challenged – by development, invasive species and, increasingly, climate change. Extreme weather events, higher annual temperatures and more frequent periods of drought are putting a strain on tree health, and stressed trees face increased risk of disease and insect damage.

Across Canada, cities are testing and promoting a variety of approaches to help urban forests adapt to climate change. For instance, greater genetic diversity in tree species planted offers urban forests protection from catastrophic losses caused by drought, insects such as emerald ash borer, and diseases such as Dutch elm disease. Many communities are also exploring ways to maintain and increase the extent of tree canopy cover. Property owners can help by keeping their existing trees healthy and planting new and more diverse species.

Interested urban residents can express their inner scientist by participating in "citizen science" projects. Often led by governments or non-profit organizations, these projects rely on local residents to record forest and tree observations and relay the information to scientists.

Urban forests in four major Canadian cities



HALIFAX REGIONAL MUNICIPALITY

41% urban forest canopy cover

$31.37 million
total benefits per year

GREATER MONTRÉAL

20% urban forest canopy cover

$24.44 million
total benefits per year

TORONTO

30% urban forest canopy cover

$81.29 million
total benefits per year

GREATER VANCOUVER REGIONAL DISTRICT

43% urban forest canopy cover

$224.15 million
total benefits per year

Sustainability indicators

Canada's forests are renewable resources and rich ecosystems. They offer significant environmental benefits and many opportunities for responsible economic development that contributes to the quality of life of all Canadians.

Forests are an essential part of the solution to many global challenges. The ability of forests to mitigate the effects of climate change, provide renewable products and energy, support high-paying jobs and contribute to a greener economy has received increasing attention. At the same time, climate change and extreme weather events affect Canada's forests and the communities that depend on their benefits.

Careful monitoring to help keep Canada's forests healthy

Because of their importance, Canada's forests need to be monitored carefully to ensure that any challenges to their health are addressed. Canada recognizes the need to balance in a holistic way the many demands placed on its forests, so that current and future generations of Canadians can benefit from the many ecological, economic, social and cultural services that forests provide.

Sustainability indicators are helpful tools in providing an overall assessment of our forests and the services they provide. When measured over time, indicators:

- provide essential information for use in discussions about the state of Canada's forests
- highlight where forest management policies and practices may need to be improved
- provide authoritative information to clarify issues related to environmental performance and trade

The indicators that follow are presented in a way that addresses the most pressing questions about forests and forestry in Canada. These indicators, together with information in the *Statistical profiles* section, demonstrate changes in Canada's forests and forest practices over time and are comparable to sustainability indicators published by other countries. As members of the Montréal Process, Canada and 11 other countries have developed a common set of science-based indicators that give government, industry, researchers and the general public a way to consistently define, assess, monitor and report progress on the sustainable management of 90% of the world's boreal and temperate forests.

Collaborating to gather the best data available

The Government of Canada collects and compiles timely, accurate data on forests and forest management from authoritative sources, including provinces and territories, to create relevant and credible national-scale sustainability indicators. Collaborative initiatives between jurisdictions such as the National Forestry Database and the National Forest Inventory help ensure consistent national data are available to support evidence-based decision-making, scientific research and program delivery.

Demonstrating a flow of benefits in a changing climate

These indicators provide insight into the interactions between forests and society over time. They illustrate the complexity of sustainable forest management and the challenges posed by climate change and other emerging issues. Still, since Canada has many years of experience with sustainable forest management, Canadians can feel confident that even as economic, environmental and social circumstances continue to change, forests will continue to be managed to provide a broad range of benefits. Similarly, Canada's trading partners can feel confident that the Canadian forest products delivered to them come from sustainably managed sources with strong environmental performance.

Sources and additional information for the sustainability indicators are provided starting on page 56.

How much forest does Canada have?

Canada has 347 million hectares (ha) of forest. This represents nearly 9% of the world's forests.

What is a forest?

The Food and Agriculture Organization of the United Nations (FAO) defines forest as land spanning more than 0.5 ha where the tree canopy covers more than 10% of the total land area and the trees can grow to a height of more than 5 metres. It does not include land that is predominantly urban or used for agricultural purposes. Forest is treated as synonymous with forest land.

Land that temporarily has no trees is still considered to be a forest when the disturbance is known to be temporary and trees are expected to grow back (e.g., after harvesting, fire, or an insect infestation). This is distinct from:

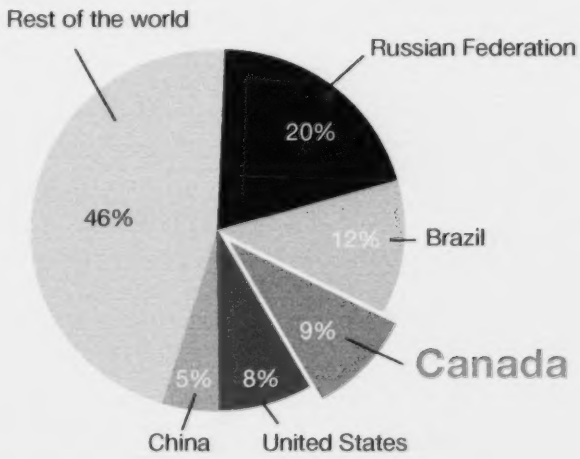
- deforestation – The conversion of forest to another land use, such as clearing for agriculture or the permanent reduction of the tree canopy cover to less than 10% of the total land area.
- afforestation – The establishment of forests through planting or seeding on land that, until then, was not classified as a forest.

Naturally caused gains and losses of tree cover are considered neither deforestation nor afforestation. After wildfire, it can take a decade or more for trees to regenerate and grow back to a height of 5 metres or more. During this period, the forest continues to provide important habitat for plant and animal species that depend on young forests – what ecologists call early successional forest habitat.

The majority of Canada's forests are on publicly owned land. Many are in parks or protected areas; others have been designated for multiple-use sustainable forest management; and still others are in remote, sparsely populated areas where forests are not designated officially for particular uses. Provincial and territorial governments collaborate with the federal government, the forest industry and other stakeholders to ensure that forest monitoring and evidence-based sustainable practices are maintained.

In previous State of Canada's Forests reports, forest area was based on the most current National Forest Inventory (NFI) baseline survey (period of measurement from 2001–2006). In an effort to provide trend data and to align with other reporting organizations, forest area is now adjusted for known deforestation and afforestation to provide adjusted values for other reporting years. The next full survey of our NFI is expected to be completed in 2017, at which time forest area will be adjusted to reflect data collected between 2007 and 2017.

Where are the world's forests?



Source: See *Sources and information* for more detail.

Indicator: Forest area

Why is this indicator important?

Knowing how and why forest area changes over time is important because permanent losses and gains in forest area affect the long-term availability of resources and the provision of wildlife habitat and other ecosystem services, such as water and air purification.

What has changed and why?

Canada's forest area is very stable. Working in collaboration, the federal, provincial and territorial governments initiated systematic tracking of forest area through the National Forest Inventory (NFI) in 2000. Since that time, the NFI has been tracking changes in forest area and using special surveys to monitor deforestation (i.e., the conversion of forest to another land use, such as clearing for agriculture, or the permanent reduction of the tree canopy cover to less than 10% of the total land area) and afforestation (i.e., the establishment of forests through planting or seeding on land that, until then, was not classified as a forest). The combined information from these surveys shows that the extent of Canada's forest has been reduced by 1.2 million hectares over the period 1990–2015 – a forest loss of less than one-half of a percent in approximately 25 years.

What is the outlook?

Under current forest management practices, the overall forest area is expected to remain stable over the next 10–20 years.

Why is Canada's forest area so stable?

In Canada, many forests grow in areas that are remote, sparsely populated and not well-suited for commercial use. In Canada, tree cover losses are often temporary. This is the case for losses caused by wildfires: Canada's forests are adapted to burning, and most forests regenerate quickly after fire. Similarly, when trees are harvested in Canada, the area is allowed to regenerate naturally or is artificially regenerated by planting seedlings or by seeding. For the most part, deforestation is low. Even so, land managers and integrated resource management planners monitor and seek to limit the amount of deforestation, and Canada's forest sector is obliged by provincial and territorial law to ensure that harvested forests regenerate to become productive forests once again.

Estimated area (millions of hectares) of forest in Canada

Year	1990	2000	2005	2010	2015
Forest area	348.3	347.8	347.6	347.3	347.1

Source: National Forest Inventory. See *Sources and information* for more detail.

Indicator: Deforestation and afforestation

Why is this indicator important?

Managing Canada's forests sustainably requires an understanding of how deforestation and afforestation affect the landbase over time. Deforestation is a concern because forests provide wildlife habitat and a number of other ecosystem services, such as water and air purification and erosion control. Forests also provide an important means of storing carbon.

What has changed and why?

Over the last 25 years in Canada, the annual rate of deforestation has declined, dropping from 63,100 hectares (ha) in 1990 to about 34,200 ha in 2014 as a result of decreases in deforestation by agriculture, forestry and hydroelectric development. Two spikes in this trend occurred in 1993 and 2006 (not shown in the table), when 35,000 ha and 28,000 ha of forest, respectively, were submerged during hydroelectric reservoir developments.

From 1990 to 2014, one-third of a percent of Canada's total forest area was converted to other land uses.

Urban and rural planting initiatives are underway in many regions of Canada, but the land area that has been afforested in recent years has been very small relative to the total forest area in the country.

What is the outlook?

Deforestation and afforestation will be affected by local and global socio-economic factors. While deforestation from activity in Canada's oil and gas sector has increased since 1990, conversion of forest to agricultural land uses will likely remain the largest cause of deforestation in Canada. The overall rate of deforestation in Canada is expected to decline further over time, but these conversions are small relative to the overall size of Canada's forests.

Deforestation is the conversion of forest to another land use, such as clearing for agriculture, or the permanent reduction of the tree canopy cover to less than 10% of the total land area.

Afforestation is the establishment of forests through planting or seeding on land that, until then, was not classified as a forest.

Estimated area (hectares) of annual deforestation in Canada, by industrial sector, 1990–2014

Sector	Year					
	1990	1995	2000	2005	2010	2014
Agriculture	42,100	22,300	20,500	17,900	12,000	12,000
Forestry*	3,700	3,300	3,600	3,500	1,500	1,500
Hydroelectric	2,700	1,500	900	900	1,600	900
Mining	2,800	2,700	2,900	2,800	3,100	3,000
Oil and gas	4,400	5,400	7,900	11,100	10,000	10,000
Transportation	2,000	1,700	3,000	2,700	2,400	2,000
Other**	900	900	900	900	1,100	1,100
Municipal	3,900	3,700	4,300	4,500	3,300	3,300
Recreation	600	700	700	600	300	300
Total	**63,100**	**42,000**	**44,600**	**45,000**	**35,500**	**34,200**

Rounding of numbers may affect column totals.
*Forestry numbers result from the creation of permanent forestry access roads.
**Other numbers result from industrial, institutional or commercial developments.

Source: National Forest Inventory. See *Sources and information* for more detail.

Indicator: Wood volume

Why is this indicator important?

The standing wood volume in Canada's forest is an important element of sustainable forest management. Professional foresters use this as well as tree growth rates and other information to determine sustainable harvest levels and inform management plans. The overall sustainable wood supply level currently estimated for Canada is 227 million cubic metres (m^3) per year.

What has changed and why?

The total wood volume in Canada's forests is about 47 billion m^3.

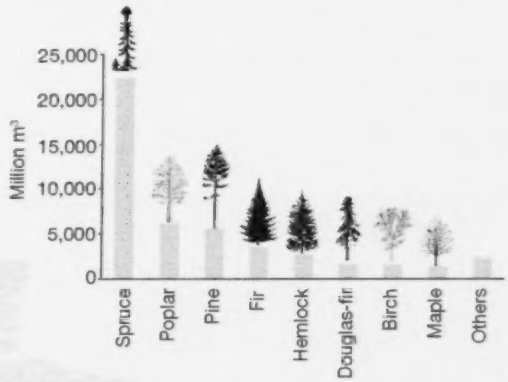
Most of Canada's forests are relatively slow-growing, but some are highly productive. Tree growth rates are determined by climate, local site conditions, tree health, tree age, genetics, and competition among trees for light, space and nutrients. Tree growth variations lead to big differences in standing volumes at sites across Canada:

- Canada's fastest-growing and oldest trees are found in the Pacific Maritime ecozone, along the coast of British Columbia. There, the average wood volume is 432 cubic metres/hectare (m^3/ha), more than triple the national average of 136 m^3/ha.
- Canada's slowest-growing forests are found in the Hudson Plains ecozone (with an average wood volume of 36 m^3/ha).

What is the outlook?

Wood volume in Canada's forests changes very slowly and is affected by natural disturbances, harvesting and growth rates. Scientists anticipate that climate change will cause more frequent wildfires in many of Canada's boreal forests. Scientists are also finding that the changing climate may cause some trees to grow faster and others to grow more slowly or become more stressed. The overall outlook for Canada's wood volume is therefore difficult to predict.

Total wood volume in Canada by species group



Pacific Maritime ecozone (fastest-growing forests – average wood volume is 432 m^3/ha)

Hudson Plains ecozone (slowest-growing forests – average wood volume is 36 m^3/ha)

Source: National Forest Inventory. See *Sources and information* for more detail.

Is timber being harvested sustainably?

Harvesting and the regeneration practices that go along with it are at the heart of Canada's sustainable forest management regime. Together, these activities ensure that the forest industry continues to provide a steady stream of benefits to Canadians and that our forests remain healthy and sustainable. While harvest and regeneration activities are the most significant interventions made by humans in terms of area, natural disturbances actually affect a far greater area of Canada's forests each year.

Harvest regulation

Over the last decade, more than 85% of the total volume of timber harvested for industrial use in Canada each year has originated from provincial Crown lands. Provincial governments regulate these harvest levels by specifying an allowable annual cut (AAC), which is the annual level of harvest allowed on a particular area of Crown land over a specific number of years (5–10 years in most cases) to ensure sustainability over the long term.

Although actual harvest levels can occasionally fall well below or above the AAC level because of market conditions or business decisions, AAC levels cannot be exceeded over a specified planning period. No AAC is determined for Canada as a whole, but it is possible to compare the combined provincial AACs with the combined timber harvest totals from the same Crown landbase.

In 2014, 148 million cubic metres (m^3) of industrial roundwood were harvested in Canada, mainly for use in the production of lumber, but also for panel products (such as plywood, veneer and oriented strandboard), and pulp and paper products. This represents approximately 0.3% of Canada's total standing wood volume (47 billion m^3).

British Columbia accounts for nearly half (45%) of Canada's industrial roundwood harvest, followed by Quebec and Alberta.

Source: See *Sources and information* for more detail.

Regeneration after harvesting

All areas of provincial Crown land that are harvested for timber are required to be regenerated naturally or using artificial means (i.e., planting and seeding) or a mix of the two. Successful regeneration of harvested areas ensures that forest lands remain productive for wood fibre and continue to provide key ecosystem services, such as storing carbon, regulating water quality and quantity, and providing wildlife habitat and recreation opportunities. Although standards and regulations for achieving successful regeneration vary by jurisdiction, they commonly address species composition, density and distribution; age and height of the regenerating trees; and the distribution of various forest types and age classes across the landscape.

Natural versus artificial regeneration

Natural regeneration offers many benefits: it needs little human assistance, it creates a solid foundation for ecosystem-based management, and it generally costs less than artificial regeneration. However, control over species composition is difficult and thinning or fill planting may be needed to ensure that density and stocking levels meet regeneration standards. As a result, artificial regeneration is often used to increase the likelihood of achieving regeneration to forest species compositions that meet forest management objectives. It also provides more control of density and stocking levels. More than half of harvested areas in Canada are regenerated through artificial regeneration.

Indicator: Area harvested

Why is this indicator important?

The annual area harvested is one of several indicators of the level of activity in the forest sector and is the largest human disturbance in the forest. Forest managers monitor area harvested, regeneration practices and wood volume inventory for planning purposes and to ensure that Canada's forests are managed for long-term sustainability.

What has changed and why?

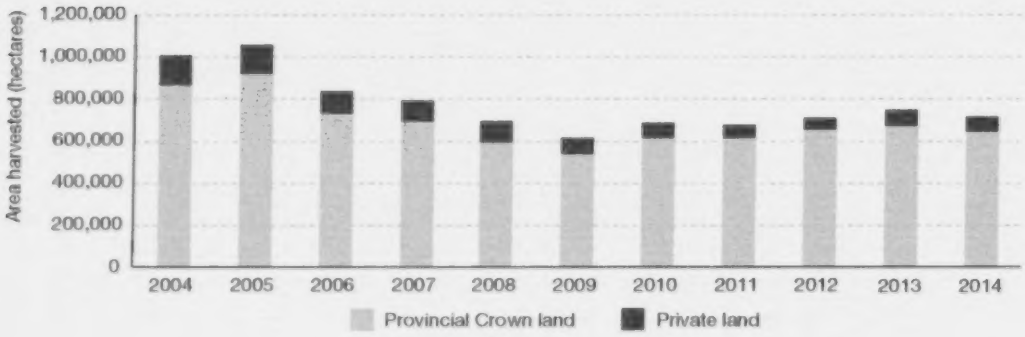
The area of Canada's forest land that was commercially harvested in 2014 decreased by almost 4% over the year before – from about 745,000 hectares (ha) in 2013 to approximately 717,000 ha in 2014. This decrease can be attributed largely to a sharp decline in the area of provincial Crown land harvested in British Columbia, as reductions in the annual allowable cut took effect after the impact of the mountain pine beetle, combined with a decline in the demand for wood products in China, the second largest export market for Canada. Although the global economy continues to improve following the 2008 recession, U.S. housing starts have not returned to average levels and overall the demand for Canadian wood products in 2014 declined compared to 2013.

While the area harvested has been trending upward since 2009, it remains well below pre-recession levels and represents less than 0.3% of Canada's 347 million ha of forest land. It is significantly smaller than the area disturbed each year by fire and insects. In 2014, for example, fires and insect outbreaks disturbed just over 7% of Canada's 347 million ha of forest land.

What is the outlook?

The harvesting of forests on Crown land, the source of most industrial wood, is regulated in such a way that the area harvested will vary based on the demand for forest products. While the demand for wood products is expected to continue to increase in the medium term as the U.S. housing market recovers, harvest levels are not expected to return to the high levels of 2004–2005, given annual allowable cut reductions in some provinces, such as British Columbia.

Forest area harvested on private and provincial Crown lands in Canada, 2004–2014



Source: National Forestry Database. See *Sources and information* for more detail.

Indicator: Regeneration

Why is this indicator important?

Successful regeneration ensures that harvested areas regrow as forests and continue to produce wood fibre and provide key ecosystem services, such as storing carbon, regulating water quality, and providing wildlife habitat and recreation opportunities.

What has changed and why?

Most harvesting occurs on provincial Crown lands, where successful regeneration is a provincially regulated requirement. The regeneration rate on harvested Crown lands in Canada is nearly 100% when artificial and natural regeneration rates are combined. Only the relatively small area required for the construction of permanent forest access roads is not regenerated.

Managers rely on natural regeneration for 40% of harvested areas. This is often the most efficient approach because of abundant existing understorey regeneration, a plentiful seed supply, or the ability of desired tree species to resprout from established root systems (e.g., lowland black spruce, tolerant hardwoods, and trembling aspen, respectively).

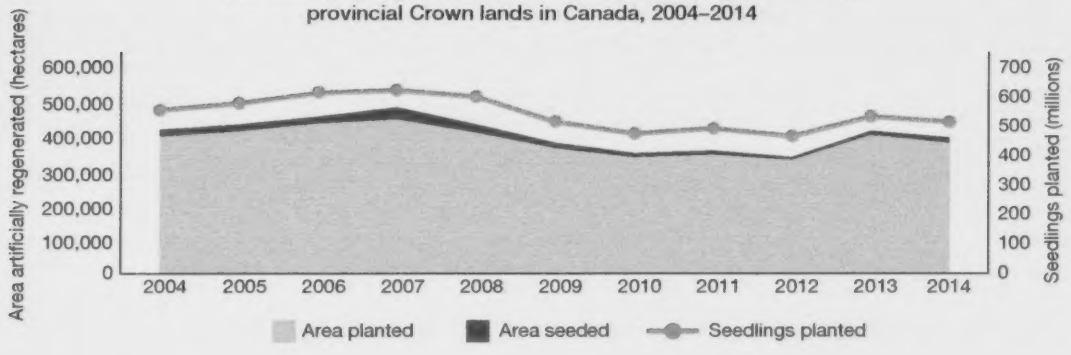
Artificial regeneration, achieved through planting tree seedlings or distributing tree seed, remains an important part of forest management, accounting for the remaining 60% of harvested areas regenerated annually, with tree planting used on about 96% of that area. Artificial regeneration contributes to sustainable forest management by ensuring that specific targets for species composition are achieved in a timely manner.

Changes in regeneration rates for artificial regeneration are closely tied to harvest rates but tend to lag behind slightly because of the time that may be required for planning, site preparation and the acquisition of nursery stock. The rate of artificial regeneration on Crown land has averaged 406,000 hectares annually. Most of that area has been planted with 543 million seedlings per year, over the past 10 years. The area seeded varies from year to year, but on average is about 4% of the total area artificially regenerated.

What is the outlook?

Successful regeneration is a regulated requirement on all Crown lands in Canada, so virtually all harvested lands will continue to be regenerated. In any given year, the total area regenerated will be primarily related to recent harvest levels, which are influenced by market conditions for wood products. The proportions of artificial and natural regeneration are unlikely to deviate significantly from recent trends in the current management and business environment.

Area artificially regenerated and number of seedlings planted on provincial Crown lands in Canada, 2004–2014



Source: National Forestry Database. See *Sources and information* for more detail.

Indicator: Volume harvested relative to the sustainable wood supply

Why is this indicator important?

"Sustainable wood supply" is the term used to describe the estimated volume of timber that can be harvested from an area while meeting environmental, economic and social objectives. Tracking harvest volumes allows forest managers to determine whether they fall within sustainable levels.

What has changed and why?

Between 2013 and 2014, Canada's estimated sustainable wood supply rose slightly, from an estimated 224 million to 227 million cubic metres (m^3), an increase of nearly 1.5%.

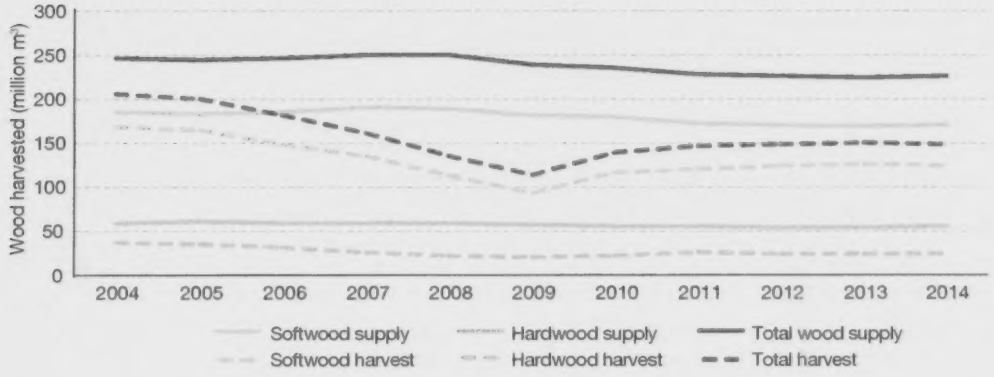
The total volume of timber harvested in 2014 from all jurisdictions (provincial Crown, territorial, private and federal lands) remained relatively unchanged from 2013 levels, at about 148 million m^3 – still well below the level of harvest deemed to be sustainable.

What is the outlook?

Given the strong regulatory regimes in place across Canada, harvest levels are expected to remain below the estimated sustainable wood supply. In the medium term, the gap between the volume harvested and the volume deemed to be sustainable can be expected to narrow as the global demand for forest products increases.

Canada estimates its sustainable wood supply by using information from all jurisdictions (provincial, territorial, private and federal lands). Provincial Crown land harvests are regulated by allowable annual cut (AAC). Sophisticated computer applications help forecast future sustainable wood supply by incorporating new advances in forest science and by accounting for wood losses caused by natural disturbances. While there is no AAC calculated for Canada as a whole, the aggregate of AACs across all provinces and territories has been relatively constant since 1990. In 2014, only two-thirds of this allowable cut was actually harvested.

Annual harvest versus supply deemed sustainable for harvest, 2004–2014



Source: National Forestry Database. See *Sources and information* for more detail.

How does disturbance shape Canada's forests?

Canada's forests are influenced by a range of natural disturbances that vary in severity, extent and frequency. Natural disturbances have occurred in Canada's forests at least since the retreat of glaciers, more than 10,000 years ago, often renewing whole forest landscapes and shaping forest composition, structure and habitat diversity. Fire, insects, disease, drought and wind storms all affect the forest on an ongoing basis, with their relative importance varying regionally. Climate change is affecting all these disturbances and, through them, may change future forest landscapes, with impacts on society.

Climate change and fires

The area affected by forest fire across Canada is highly variable among regions and between years because climate is different across regions, and weather varies from year to year. Climate change is gradually imposing an increasing trend on forest fires, a trend that is partially masked by the large variability of this disturbance. An increasing annual area burned will gradually make Canada's forests younger and possibly enhance the slow process of change in species dominance and composition. An increase in area burned could also impact society – directly by increasing fire risks to communities and infrastructure and indirectly by reducing the area available for harvest.

Climate change and insects

Insect populations also respond to climate change, but through a more complex web of biological interactions that may enhance or decrease outbreak extent and severity. A succession of warm winters in central British Columbia made the mountain pine beetle outbreak possible, affecting tens of millions of hectares of forest. The current spruce budworm outbreak in eastern Canada is taking place in northern regions that used to be too cold for the insect to cause significant damage; climate change may also gradually push it yet farther north, out of the range of balsam fir, its currently preferred tree host.

Climate change and invasive species

Always more uncertain are the risks posed by invasive insects and diseases. The cold climate that is typical for much of Canada's forested land has served as a barrier to many invasive species, but the warming climate is lowering this barrier. Some invasive species already established in North America are slowly moving north, while new arrivals may have a better chance of surviving. Expanding global trade increases the risk of introducing new invasive species, although ever-improving phytosanitary measures help reduce this risk.

Adapting our forest and forest sector

Knowledge of past forest growth and dynamics will still inform forest management decisions, but climate change must be recognized as an agent of increasing uncertainty and change. Because of the relatively long lifespan of trees, forests tend to change slowly in response to the changing climate. Single or cumulative disturbances can nevertheless create rapid local changes, such as a change in the tree species that dominate or even a reduction in how many trees grow back. Identification and monitoring of areas prone to such events may help inform forest management decisions. Capturing the increased growth potential resulting from a warming climate is also being explored in many regions of Canada as an adaptation option.

Assisted migration is an adaptation option through which the generally northward or upslope movement of warmer growth conditions is matched when regenerating a site after harvesting, by planting seeds and/or seedlings of species or populations that are better adapted to the warmer conditions. With more than 400,000 hectares planted in Canada annually, forest managers have an opportunity to apply this relatively low-cost and low-risk approach. Some provinces are implementing assisted migration. For example, in Alberta, guidelines have now extended the seed zone northward by up to 2° latitude and upslope by up to 200 metres.

Source: See *Sources and information* for more detail.

Indicator: Forest diseases

Why is this indicator important?

Forest pathogens play an important role in forest ecosystems as agents of tree disease. Although forest diseases contribute to the cycling of nutrients in the forest and can promote biodiversity by creating habitat, they can also cause significant economic loss in forests managed for timber production.

What has changed and why?

Native trees and native forest pathogens have co-evolved for millennia, resulting in a fine balance in which native pathogen impacts on native trees are typically not catastrophic. However, this balance is threatened by climate change. For example, Canada's boreal forest is expected to become drier as a result of climate change, and drought may contribute to increased damage from forest pathogens as defences of stressed trees are compromised. Forest pathogens also rely on suitable environmental conditions for spread and infection, which may be altered as a result of climate change.

In addition to climate change, the introduction of exotic pathogens, such as *Cronartium ribicola* (the causal agent of white pine blister rust), which continues to have a significant impact on Canada's white pines, is a risk that also must be mitigated.

What is the outlook?

When combined, the impact of climate change and established and new invasive forest pathogens on Canada's forests is difficult to predict and is potentially more serious than each issue on its own. Additionally, the geographic ranges of both hosts and pathogens are expected to change, as climatic suitability influences both host and pathogen, thereby facilitating change in the range of pathogens. Forest managers must plan for increasing impacts from forest pathogens as part of their climate change adaptation strategies.

Dothistroma needle blight is an endemic forest disease in Canada. Recent increases in damage to lodgepole pines by the Dothistroma needle blight are believed to be linked to climate change.

Lodgepole pine affected by Dothistroma needle blight in central Alberta in 2015.

Source: See *Sources and information* for more detail.

Indicator: Forest insects

Gypsy moth

Emerald ash borer

Why is this indicator important?

Forest insects often have impacts that are obvious and easy to track, making them useful indicators of forest health. While these natural disturbances are a normal part of healthy forest ecosystems, they can also affect productivity in commercial forests and have a potentially negative impact on environmental values associated with forested landscapes.

What has changed and why?

In 2014, 20.3 million hectares (ha) of forest were damaged by insects. This is virtually unchanged from the total in 2013. While the area damaged by some insects has decreased, the area damaged by other insects has increased.

Bark beetles

Since peaking in 2007, the area affected by the mountain pine beetle in British Columbia continued to decline in 2014, shrinking by 765,000 ha to 2.2 million ha.

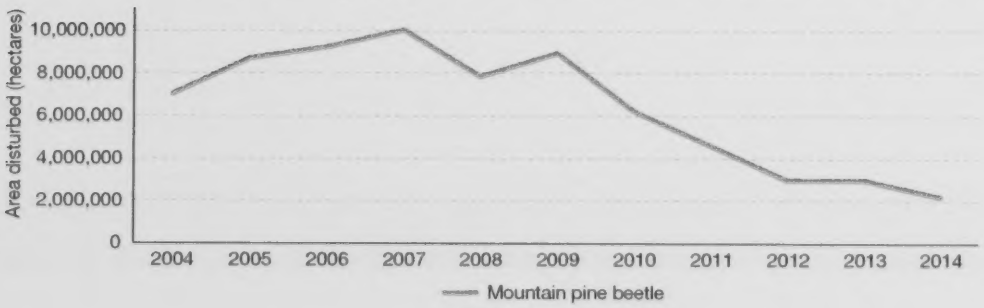
A spruce beetle infestation in northern British Columbia increased significantly in 2014 to 290,000 ha and has the potential for further expansion. However, it is still quite small compared to current or past areas affected by mountain pine beetle.

Non-native invasive species

Non-native invasive species, such as gypsy moth and emerald ash borer, remain a special concern because of their novel and uncertain ecological and socio-economic impacts.

Non-native species are often pests in urban environments, where their impacts are related to aesthetic, health and community benefits and the cost of control or tree removal, rather than to timber values.

Forest area affected by mountain pine beetle in British Columbia, 2004–2014



Source: National Forestry Database. See *Sources and information* for more detail.

Forest tent caterpillar

Defoliators

The forest tent caterpillar outbreak that expanded so rapidly in 2013 continues to affect nearly 6 million ha of predominantly aspen forest in central and western Canada. This defoliator exhibits classic population cycles 8 to 11 years in length, with the last maximum occurring in 2006. Populations in Alberta appear to have peaked in 2013 and were on the decline in 2014, while the amount of area defoliated to the east and west was still increasing, particularly in Manitoba and Ontario.

The eastern spruce budworm outbreak in Quebec continues to increase, with 3.4 million ha undergoing moderate to severe defoliation in 2014. The abundant foliage of the host trees for spruce budworm and forest tent caterpillars sustains population increases, and the resulting defoliation decreases tree growth. If defoliation is severe or persists for several years, tree mortality can occur. Areas near the origin of the spruce budworm outbreak have now experienced seven to eight years of annual defoliation, and significant mortality is beginning to occur.

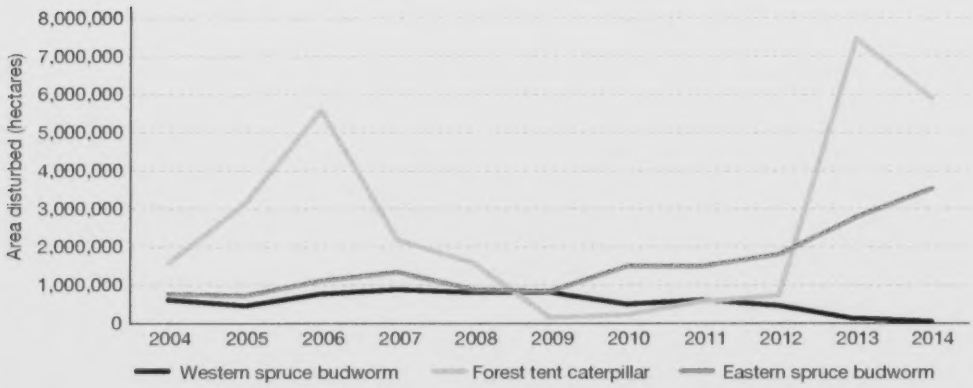
What is the outlook?

The mountain pine beetle outbreak in British Columbia seems to have run its course and will likely continue its decline to historical background levels, in part because the host tree species (lodgepole pine) has been largely decimated. Populations are persisting in Alberta, but it remains unclear how far east and north the beetles will spread.

The spruce budworm outbreak in eastern Canada is expected to continue increasing in area. If recent trends continue, the outbreak will have encompassed 6 million ha in 2015 and is predicted to cover 10 million ha in 2016. Tree mortality in the core areas will also likely increase.

While the area defoliated by forest tent caterpillar in Alberta will likely decline, simultaneous growth in Manitoba and Ontario could substantially increase the total area defoliated. Previous outbreaks in Ontario have involved approximately 15 million ha, and Manitoba experienced more than 10 million ha of defoliation in 1975–1976. Although short-lived tent caterpillar outbreaks rarely result in much tree mortality, potential interactions with regional droughts could exacerbate the impact of this species.

Forest area containing defoliated trees for three insects in Canada, 2004–2014



Source: National Forestry Database. See *Sources and information* for more detail.

Indicator: Forest fires

Why is this indicator important?

Forest fires present a challenge for forest management because they have the potential to be at once harmful and beneficial. Fires can threaten communities directly or with smoke, resulting in public safety concerns and costly economic losses. They can also destroy vast amounts of timber resources, although some timber from burned areas can be salvaged for use in forest products. On the other hand, forest fires are a natural part of the forest ecosystem and are important in many parts of Canada for maintaining the health and diversity of the forest.

Information on trends in the fire situation across the country is important for assessing both the health of Canada's forests and the effects of the changing climate.

What has changed and why?

With warmer, drier climatic conditions, the severity of fire weather conditions in Canada appears to have increased, and the fire season has become longer, with more fires burning in April and October than in previous years.

In 2015, a total of 7,068 forest fires burned about 3.9 million hectares (ha):

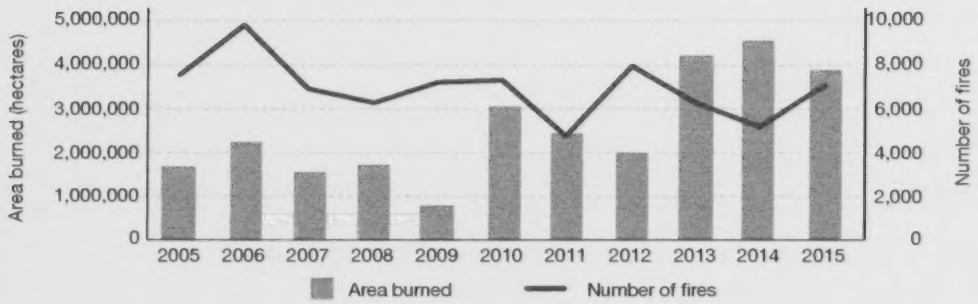
- While the number of fires was slightly above its 10-year average, the area burned was about 50% above the 10-year average.
- Saskatchewan had three times its 10-year average in area burned, at more than 1.76 million ha.
- Alberta had more than twice its 10-year average, with just below 500,000 ha burned.
- In natural parks across the country, the area burned was about four times the 10-year average. These increases were somewhat offset by Atlantic Canada, Quebec, Ontario and Manitoba, all of which had less area burned than their 10-year averages.
- In Quebec, the area burned was less than 2% of its 10-year average.

In addition, forest fires resulted in 125 community evacuations in 2015, affecting approximately 15,000 people.

What is the outlook?

When and where significant fire activity occurs varies greatly from year to year. Analyses of fire trends are beginning to show an increase in both the annual variability of fire seasons and the length of the fire season. These emerging trends may in turn result in changes to the cost of fighting fires and more impacts on people, such as loss of houses and evacuations.

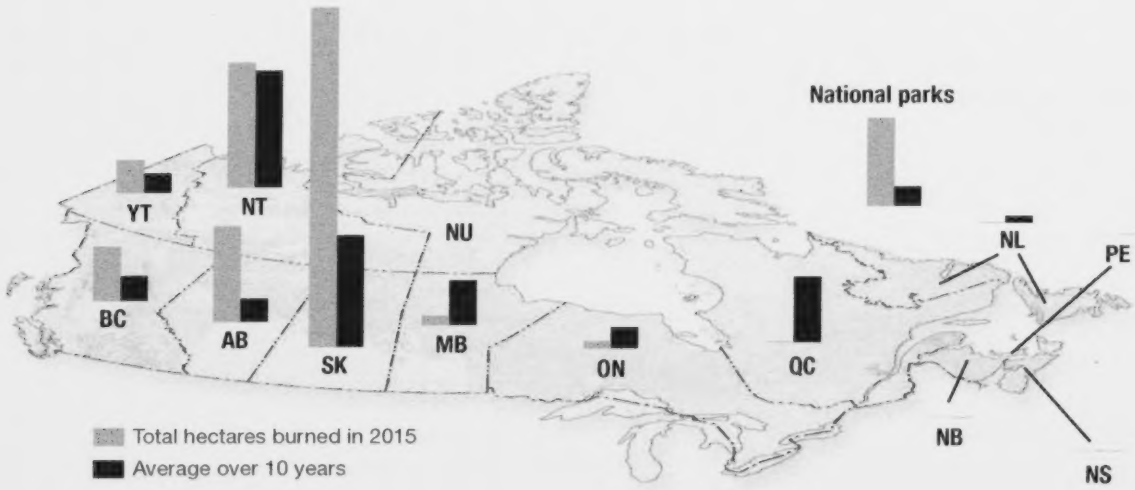
Forest area burned and number of forest fires in Canada, 2005–2015



Sources: National Forestry Database; Canadian Interagency Forest Fire Centre. See *Sources and information* for more detail.

Forest fires in Canada

The 2015 fire season was marked by an early and intense start. By the end of June, 4,076 fires had consumed more than 1,352,383 hectares (ha) across the country – nearly a 60% hike in area burned compared to the 10-year average. Canadian firefighters across the nation, with the help of nearly 500 firefighters from the U.S., Australia, Mexico, South Africa and New Zealand, mobilized to fight the wildfires concentrated in western Canada. About 45% of the total forest area burned in 2015 was in Saskatchewan.



Area burned (hectares)

Province/territory	2015	10-year average
British Columbia (BC)	280,445	127,302
Yukon (YT)	169,841	97,991
Alberta (AB)	492,536	117,842
Northwest Territories (NT)	646,955	606,577
Saskatchewan (SK)	1,758,376	575,954
Manitoba (MB)	47,358	228,617
Ontario (ON)	39,311	110,496
Quebec (QC)	5,380	338,525
Newfoundland and Labrador (NL)	3,958	36,400
New Brunswick (NB)	262	326
Nova Scotia (NS)	517	868
Prince Edward Island (PE)	2	21
Nunavut (NU)	-	-
National parks	458,335	100,502
Total	**3,903,276**	**2,401,481**

Source: Canadian Interagency Forest Fire Centre. See *Sources and information* for more detail.

Indicator: Carbon emissions and removals

Why is this indicator important?

Globally, forests play an important role in the carbon cycle, every year removing about one-quarter of all fossil fuel emissions from the atmosphere. Carbon emissions and removals from managed forests are an important indicator of the contribution of Canada's forests to the global carbon cycle. (See the carbon cycle diagram on page 8 for more information.)

What has changed and why?

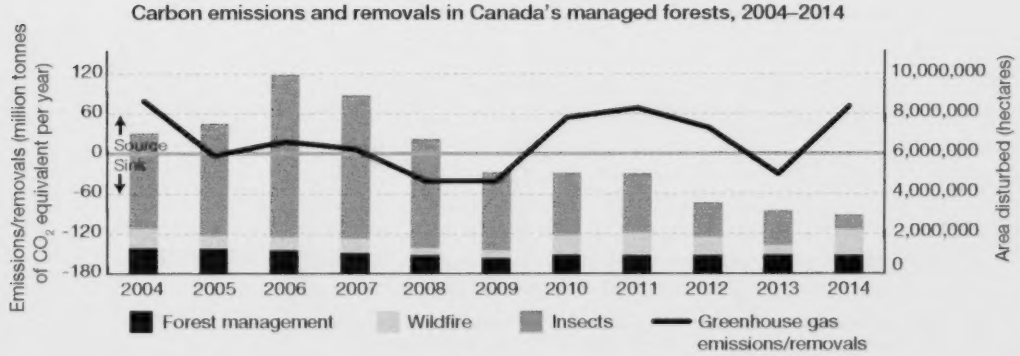
In 2014, mostly as a result of significantly higher numbers of forest fires than in previous years, Canada's managed forests and forest products sector were a net carbon source, releasing about 71 million tonnes (Mt) of carbon dioxide equivalent (CO_2e), or 19 million tonnes of carbon (Mt C), to the atmosphere. This is a change from 2013, when 48 Mt CO_2e were sequestered.

What is the outlook?

The annual carbon balance of Canada's managed forests varies greatly from year to year, in response to the impacts of natural disturbances, such as fires and insect outbreaks, and changes in harvest rates. The rates of future natural disturbances are inherently difficult to predict, and the outlook for this indicator is therefore difficult to predict.

Although mountain pine beetle impacts in western Canada continue to decline, the impacts of other insects are increasing and the vulnerability of Canada's managed forests to forest fires remains high. Localized drought and the trend to higher average temperatures throughout Canada certainly increase the risk of forest fires, although the area burned in 2015 was somewhat smaller than in 2014.

Carbon emissions and removals in Canada's managed forests, 2004–2014



Sources: Natural Resources Canada–Canadian Forest Service calculations; Environment and Climate Change Canada, *National Inventory Report 1990–2014: Greenhouse gas sources and sinks in Canada*. See *Sources and information* for more detail.

Spotlight: Assisted migration as a climate change adaptation tool

Climate change is expected to exert pressure on species to either adapt or move. Climatic ranges for many tree species in Canada are expected to shift northward by roughly 300 kilometres (km) over the next 50 years. Given that tree species have an average migration rate of about 5 km per 50 years, it is unlikely that they will be able to keep up with these projected shifts. Tree species therefore may no longer be suited to their environment, which could reduce forest health and productivity and have related impacts on forest biodiversity.

Conservation concern versus risks

Assisted migration is the human-assisted movement of plants and seeds to new locations where they will be suited to projected future climate conditions. Some species are thought to be particularly vulnerable to climate change, and proponents of assisted migration suggest that this approach may be the only means to save them. But there are well-documented risks associated with the movements of species, including invasive spread of the species and introduction of new pests and diseases throughout the new location, as well as wasted resources associated with failed attempts to move species. These risks have led to debate about whether there is an appropriate role for assisted migration in biodiversity conservation efforts.

Lower risk with commercial tree species

However, a different style of assisted migration has emerged in the context of forest management. Because major tree species generally have large geographic ranges, assisted migration of seeds or seedlings can occur within, or slightly beyond, existing current range limits, significantly reducing the risks. In Canada, while provincial resource management agencies have previously restricted the movement of seeds to ensure that sites are regenerated using locally adapted sources, interest in assisted migration is growing, and several provinces have recently modified policies to allow expanded northward and "upslope" seed movements (i.e., using seeds at higher elevations).

Source: See *Sources and information* for more detail.

Scientific advances in this area are being made through the use of data from forest genetics trials, which provide insights into how seed sources may respond to rapid climate change. Given that hundreds of thousands of hectares of forest are regenerated annually in Canada, assisted migration of commercial tree species could represent a relatively low-risk and potentially effective approach to introducing a degree of climate change resilience into Canadian forests in the future.

An oak tree at an assisted migration trial near Pickering, Ontario. In this collaboration between Natural Resources Canada and the Ontario Ministry of Natural Resources and Forestry, a variety of hardwood species have been planted from seed sources 200–600 km south of the trial site to test both the species' and the population's response to a different climate.

How do forests benefit Canadians?

Forests and the forest sector play a vital role in the well-being of all Canadians, including those who live in urban areas.

Economic benefits

The forest industry is an important source of income for one out of every seven Canadian census subdivisions.* While other natural resource sectors are often regionally concentrated, the forest sector is widely distributed, employing Canadians from coast to coast. In 2015, the forest industry accounted for 201,645 direct jobs. For many Canadians in rural areas, these jobs are crucial to ensuring their communities' economic sustainability.

With 16 consecutive quarters showing positive operating profits, the forest industry appears to have emerged from the 2008 economic crisis: both employment and income have been relatively stable in recent years. In addition to improved job security, the sector offers job quality; today's forest sector is becoming an increasingly dynamic, progressive place to work. The industry provides foresters, scientists, engineers, computer technologists, technicians and skilled tradespeople with long-term career opportunities in a wide variety of well-paid jobs. Thanks to almost 95,000 indirect jobs created around its industries, the forest sector's economic benefits trickle down through entire local economies.

*Municipalities or areas that are deemed to be equivalent to a municipality for statistical reporting purposes.

Indigenous participation in the forest sector

Forests play a central role – culturally, spiritually and economically – in the lives of many Indigenous communities across Canada. As of 2011, 70% of Indigenous communities in Canada were located in forested areas, and about 9,500 Indigenous people were employed in the forest sector.

Over the past decade, many provinces and territories have engaged in tenure reform efforts to encourage greater local and Indigenous community participation in the forest sector, creating new economic development opportunities for these communities.

Between 2003 and 2013, Indigenous peoples' interests increased their share of total Canadian tenure volume from 5% to over 10%. Many Indigenous communities have successfully turned this expanded access to forest land and resources into economic benefits. Governments are actively supporting this effort by supporting forest-based business development, community readiness and employment activities for Indigenous communities across Canada.

Benefiting from trees and forests

- Trees and other forest plants act as natural cleansers, filtering pollutants from air and water.
- In cities, tree cover helps to reduce surface and air temperatures and improve air and water quality. Since a majority of Canadians live in urban areas, these benefits are considerable.
- Forests also provide recreational and cultural benefits – whether in wilderness areas, managed stands or urban parks. With 11 million Canadians living in or adjacent to forested areas, these benefits are deeply valued and enjoyed by people across the country.

Source: See *Sources and information* for more detail.

Indicator: Employment

Within Canada, wood product manufacturing and forestry and logging employment is concentrated in British Columbia and Quebec, while employment in pulp and paper product manufacturing is highest in Ontario.

Why is this indicator important?

The Canadian forest industry is an important employer nationwide. While the forest industry contributes to the economic, social and environmental welfare of all Canadians, its contribution is particularly important in many rural and Indigenous communities, where forest-related work is often the main source of income.

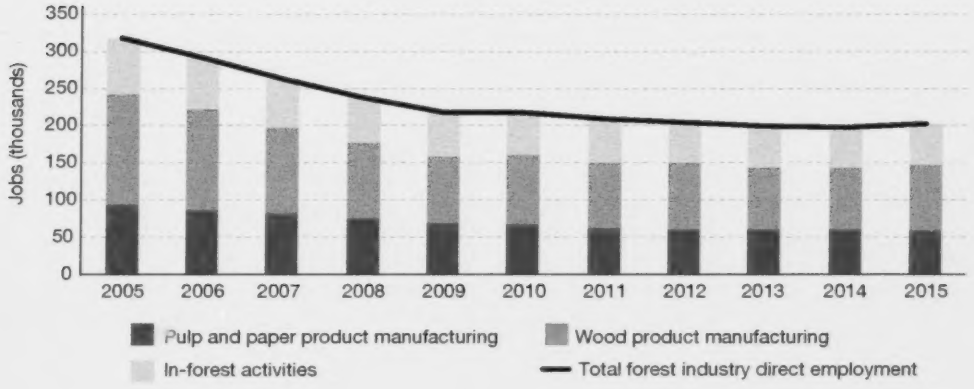
What has changed and why?

In 2015, direct employment in the Canadian forest industry, as measured by Statistics Canada's System of National Accounts, increased by 1.5% from 2014 levels, to 201,645 jobs. The job gains are in line with other positive indicators, such as increasing forest sector contribution to Canada's gross domestic product (GDP) and financial metrics. But employment did not improve in all forest sub-sectors: employment in the pulp and paper sector decreased as a result of poor market conditions for newsprint and other paper products, which has caused several mill closures.

What is the outlook?

The outlook is positive in the lumber and wood panel markets, with U.S. demand expected to be strong. However, the reduced fibre supply in some parts of Canada could slow production and reduce the likelihood of much employment growth in these segments. The Canadian production of pulp and paper products is less certain, given the economic slowdown in China and the decline in global paper demand. This is particularly true for newsprint and printing and writing paper, of which Canada produces a sizable amount. Overall, the number of jobs in the forest industry should remain stable or decline slightly in 2016.

Forest industry direct employment, 2005–2015



Source: Statistics Canada, System of National Accounts. See *Sources and information* for more detail.

Indicator: Average earnings

Why is this indicator important?

"Average earnings" shows the average net annual income per person directly employed in the forest industry. Trends in average earnings indicate the importance of the forest industry to the economy and the social well-being of Canadians, especially when compared with average earnings in other industries.

What has changed and why?

In 2015, average earnings in the forest industry increased by 7% over 2014 levels. This growth pushed average earnings just above levels last seen in 2002 and is consistent with the increase in sector profits.

Average earnings increased markedly in pulp and paper manufacturing (10%), with relatively lower growth in forestry, logging and support activities (7%) and wood products (5%). This is surprising, given the continuation of adverse market conditions for many pulp and paper products over the past year, which resulted in a decline in production and employment.

The growth in average earnings in the forest industry is higher than the trend in the manufacturing sector as a whole, which increased by 4%.

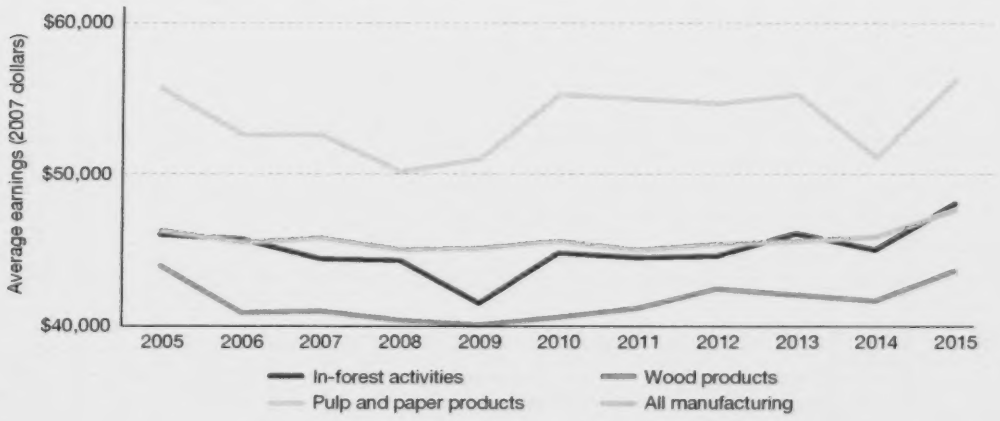
In 2015, average earnings in the paper products sub-sector were 18% higher than those in all manufacturing sectors. For forestry, logging and support activities, average earnings were just 1% more. However, average earnings in the wood products sub-sector remained 9% below those in all manufacturing sectors.

What is the outlook?

Average earnings in the forest industry will continue to increase in the short term. However, they may begin to decline in some areas of the pulp and paper sector as producers force down costs to survive in declining markets. Moreover, intermittent local labour shortages and surpluses and pre-existing wage disparities will result in significant regional variation in earnings.

According to *Canadian Business*, in 2015 "mining and forestry manager" was ranked first in Canada's 100 best jobs, with a median salary of $108,000.

Average earnings in the forest industry compared with all manufacturing sectors, 2005–2015



Source: Statistics Canada, Survey of Employment, Payrolls and Hours. See *Sources and information* for more detail.

Indicator: Communities

Why is this indicator important?

The forest sector is important to many communities because it provides employment, income and many health and lifestyle benefits associated with living near trees.

What has changed and why?

The communities indicator reflects the importance of forests in providing recreational, cultural, traditional and spiritual benefits in addition to employment and income. Forest proximity, forest sector income and forest sector Indigenous employment across Canada together indicate how forests influence the lives of Canadians.

Forests have a significant influence on quality of life for many Canadians. Despite ongoing urbanization, over 11 million Canadians still live in or adjacent to forested areas. In addition, the forest sector is a major economic driver in 171 census subdivisions,* or 14% of all census subdivisions in Canada. The forest sector is also one of the largest employers of Indigenous people in the country.

In areas where large proportions of workers and revenue are linked to the forest sector, social and economic well-being are highly dependent on the economic strength of the sector. This means that when the forest sector faces challenges, community well-being can suffer.

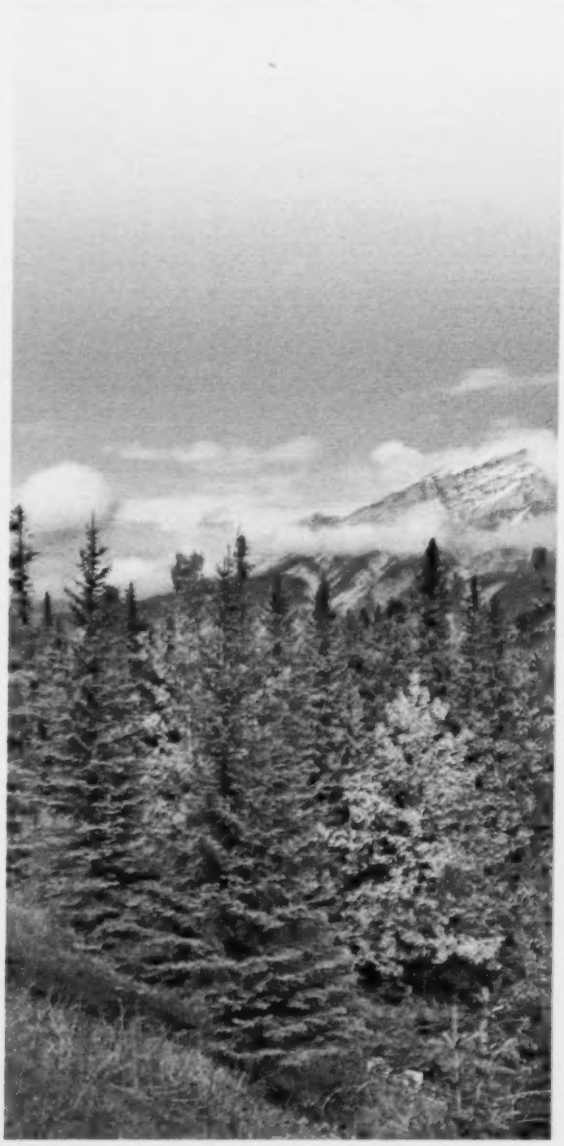
What is the outlook?

Regions that are heavily dependent on the forest sector have suffered significantly during the forest sector crises of the past decade, and many have responded by diversifying their economies, in some cases expanding into non-timber forest-related areas of business, such as recreation and ecotourism. The forest sector is now recovering, and new opportunities are becoming available across Canada, including non-traditional areas such as bioenergy, bioplastics and green chemicals (see "5 reasons why wood is one of Canada's most valuable resources" on page 15.) The forest sector will continue to be important for many Canadians in a continually evolving form and will play a key role in Canada's transition to a green, low-carbon economy.

Source: See *Sources and information* for more detail.

- ***Close to one-third of Canadians live in or adjacent to forested areas.***
- ***The forest sector is a major source of income for 171 census subdivisions.****
- ***About 9,500 Indigenous people are employed in the forest sector.***

*Municipalities or areas that are deemed to be equivalent to a municipality for statistical reporting purposes



Spotlight: Bioenergy in Indigenous communities

Using wood-based biofuels for heat and power can be a cost-competitive, economically sustainable and reliable alternative to non-renewable energy sources. This is particularly true for many of the remote and northern Indigenous communities across Canada that currently rely on imported, expensive and greenhouse gas intensive diesel fuel for the production of electricity. Recognizing the environmental and economic benefits of using forest biomass for heat and power, a number of Indigenous communities throughout the country have undertaken a transition to bioenergy technologies.

A clean supply of energy

Whitesand First Nation, an Indigenous community located about 250 kilometres north of Thunder Bay, Ontario, is one of 25 remote communities in northwestern Ontario that are not connected to the provincial electrical grid and are completely reliant on diesel fuel for power generation. Because of the region's extreme cold temperatures, Whitesand First Nation's diesel generator operates near peak capacity during the long winter months, using approximately 1 million litres of fuel annually. At an average of $0.47/litre, the fuel costs the community hundreds of thousands of dollars each year.

The Province of Ontario is currently expanding the electrical grid, but Whitesand First Nation is not expecting to be connected, because of its remoteness. With the support of the Government of Canada and the Province of Ontario, Whitesand First Nation is developing plans for a pellet manufacturing plant and a heat and power biomass facility. Once constructed, these facilities will provide a clean supply of electricity for the communities of Collins and Armstrong, and replace an estimated 90-95% of the diesel-generated electricity used by Whitesand First Nation. The facilities will be operated by community members and sourced by local hardwood resources, providing approximately 50 full-time and 60 seasonal employment opportunities.

Bioenergy in the North

Recognizing the economic and environmental benefits of forest-based bioenergy, the Government of Northwest Territories set out to increase the use of biomass across the territory through its biomass energy strategies, released in 2010 and 2012. Activities since then have focused on transitioning public buildings to biomass heating systems, examining the potential for integrating biomass in public housing, and partnering with the Government of Canada to support Indigenous communities in creating Indigenous-owned firms to manage forest resources and supply wood fibre to local producers of bioenergy products. A key private partner in this process has recently purchased 320 hectares of land from the hamlet of Enterprise to support a proposed wood pellet venture.

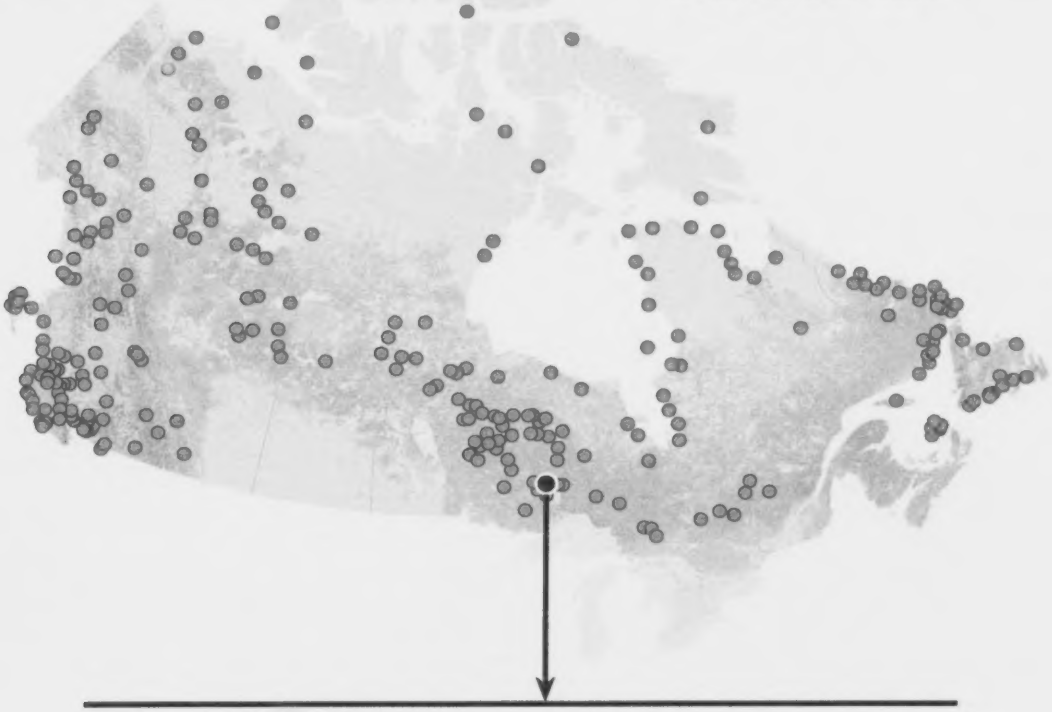
Town by Great Slave Lake, Northwest Territories.

A viable option

The transition to biomass energy by Whitesand First Nation and the Government of Northwest Territories highlights the inherent value of capitalizing on the use of sustainably harvested local forest products and the unique capacity of Canada's forests to contribute to climate change mitigation objectives, create local employment opportunities and ultimately enable remote and northern communities to achieve greater energy self-sufficiency. These initiatives also demonstrate the viability of transitioning to alternative fuel sources for other remote and northern communities and governments.

There are approximately **192 remote Indigenous communities in Canada,** representing **268,835 people**, and **136 communities** rely on diesel fuel as their main power source.

Remote Indigenous communities across Canada



Whitesand First Nation
Registered band members: 1,239

On the reserve
Population: 354
Number of households: 87
Main power source: diesel fuel

Source: See *Sources and information* for more detail.

How does the forest industry contribute to the economy?

The Canadian forest industry is an export-oriented manufacturing sector, accounting for almost 7% of all Canadian exports in 2015 ($32.7 billion). Traditional forest products form the backbone of the Canadian forest sector: Canada is the world's largest producer of newsprint and northern bleached softwood kraft pulp and the second-largest producer of softwood lumber. In recent years traditional and other forest products have contributed 8% to 10% of Canada's manufacturing gross domestic product (GDP).

Although it contributes less to total GDP than other resource sectors do, the forest sector is a key contributor to the Canadian economy. For example, the forest sector creates more jobs and contributes more to the balance of trade for every dollar of value added than do the minerals and metals sector or the energy sector.

Global trade

The forest sector contributes favourably to Canada's trade balance. In 2015, the forest sector balance of trade stood at $21.5 billion, compared to a negative balance for the economy as a whole. Canadian producers operate in the global marketplace and have become less dependent on the regional North American market. Exports to Asian markets, mainly China, helped mitigate the negative consequences of the U.S. housing crash and financial crisis. The U.S. market share of forest product exports has declined from 81% in 2005 to 68% in 2015. However, this market continues to be the primary destination for

Canadian forest products and will remain instrumental in supporting forest sector activities in Canada, given the U.S. economic recovery and a slowdown in the Chinese economy. While globalization has also brought increased competition from low-cost producers, Canada will continue to benefit from greater access to large offshore markets.

Innovation

Non-traditional forest products have become more important to the sector and provide clean-tech development opportunities. Expanding product markets include biofuels that can substitute for fossil fuels and biochemicals that can be used to produce biodegradable plastics and industrial chemicals.

The Government of Canada has been supporting sector transformation through a number of initiatives, such as the Investments in Forest Industry Transformation program, the Expanding Market Opportunities program and the Forest Innovation program.

Benefits to Canada's economy, 2015

SECTOR	Contribution to GDP (billions of dollars)	Exports per dollar of value added	Balance of trade per dollar of value added	Number of jobs per million dollars of value added
Forests	$22.1	$1.50	$1.00	9.1
Minerals and metals	$60.2	$1.50	$0.20	6.2
Energy	$131.9	$0.70	$0.40	2.0

Source: See *Sources and information* for more detail.

Indicator: Gross domestic product

Why is this indicator important?

Gross domestic product (GDP) is the total value of all final goods and services produced annually in a country. It can be thought of as the size of a country's economy. The change in contribution of the forest industry to Canada's nominal GDP is one of the primary indicators used to gauge the health and dynamism of the forest sector, while the change in real GDP shows the growth of the forest industry after inflation is factored out – that is, the real year-over-year growth.

What has changed and why?

The forest industry contributed $22.1 billion – or 1.2% – to nominal GDP in 2015. Based on current trends in related data, this figure is expected to rise slightly for 2016. The forest industry outperformed the Canadian economy in 2015 in real terms: the forest industry's real GDP grew by 5% from 2014 to 2015, while the Canadian economy grew by only 1%.

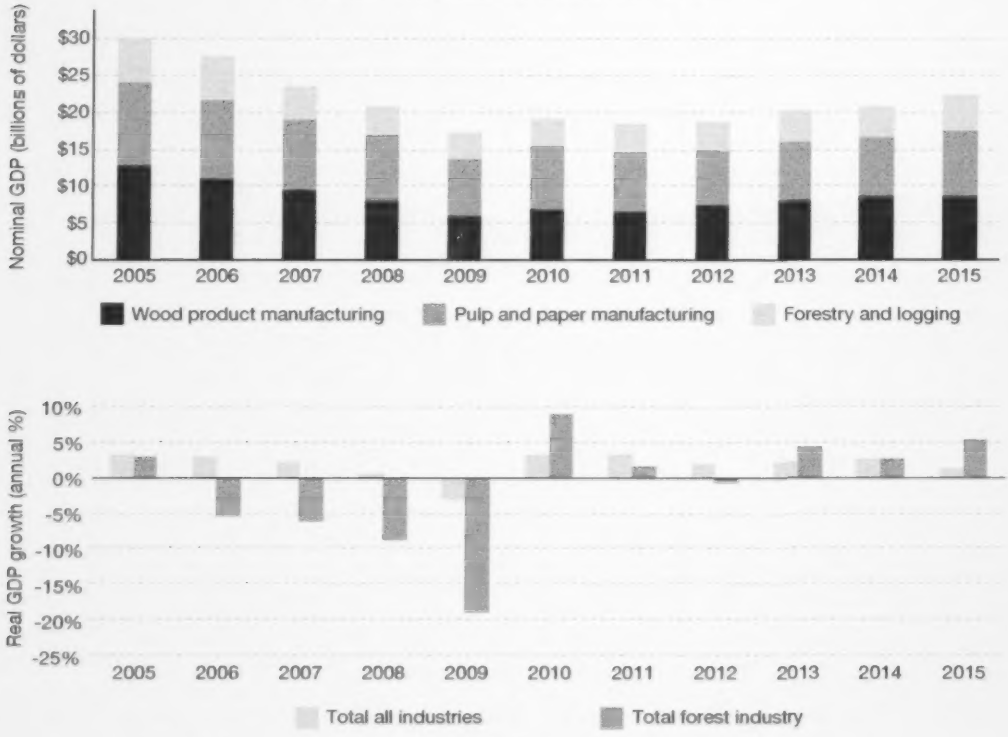
The forest sector continues to recover from the U.S. housing crash and the financial crisis. As a result, forest industry growth has tracked Canadian GDP in the past few years and has consistently accounted for approximately 1.2% of the total Canadian GDP. However, growth within sub-sectors has been variable in the past decade and mainly concentrated in forestry and logging, as well as in wood products.

What is the outlook?

In the short term, increases in the solid wood manufacturing sub-sector will continue to be offset by declines in select grades of pulp and paper manufacturing. Declines in the paper market are structural, resulting from the uptake of electronic media, and further declines are expected, as the industry will need to continually balance supply with declining demand.

The longer-term evolution of the forest industry's contribution to GDP is less clear: while a reduced fibre supply could challenge the industry's growth, ongoing industry transformation – aided by current government initiatives – is expected to add to growth.

Canadian forest industry's GDP, 2005–2015



Source: Statistics Canada. See *Sources and information* for more detail.

Indicator: Production

Why is this indicator important?

As one of the world's major forest product manufacturers, Canada's forest industry not only meets most of Canadian consumers' needs, but also supplies nations around the world. Production is an important indicator, since it is generally one of the first indicators to respond to economic and market challenges.

What has changed and why?

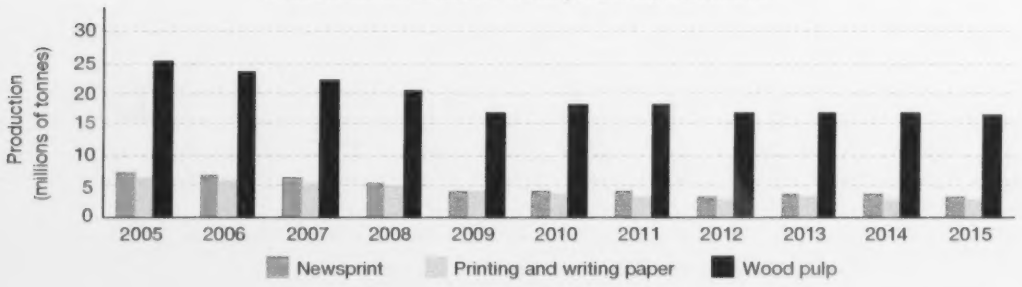
Thanks to the recovery of the U.S. housing sector, production levels of softwood lumber and structural panels continued to increase in 2015, by 8% and 4%, respectively, reaching their highest levels since the 2008 financial crisis. However, pulp and paper production declined across the board, with production of wood pulp down by 2%, printing and writing paper down 7%, and newsprint production down 13%. The benefit gained by producers from a weaker Canadian dollar against the U.S. dollar was negated by declining market demand.

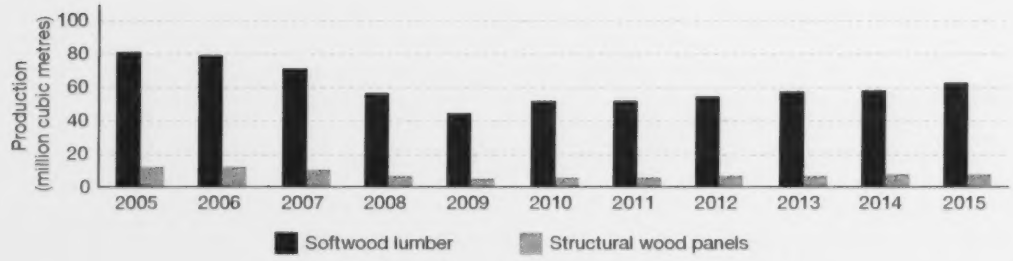
What is the outlook?

Solid wood production is expected to continue to increase for the foreseeable future, supported by the recovery of U.S. housing starts. Pulp and paper production will likely continue to show mixed fortunes, with the consumer segments (household paper and packaging) faring much better than graphic papers (newsprint, printing and writing papers). The weaker Canadian dollar will provide a temporary buffer against global economic uncertainties and the continued global shift away from paper-based media to electronic media.

Canada is the world's largest newsprint producer, the largest producer of northern bleached softwood kraft pulp, and the second-largest softwood lumber producer.

Production of Canadian forest products, 2005–2015





Sources: Lumber – Statistics Canada; panels – APA, The Engineered Wood Association; pulp and paper products – Pulp and Paper Products Council. See *Sources and information* for more detail.

Indicator: Exports

Why is this indicator important?

Forest product exports contribute substantially to the Canadian economy and significantly improve Canada's balance of trade. By value, Canada is the world's fourth-largest forest product exporter, but the world's leading exporter of softwood lumber and newsprint.

What has changed and why?

In 2015, the value of Canada's forest product exports increased by 6.3% over 2014, rising to $32.7 billion from $30.8 billion.

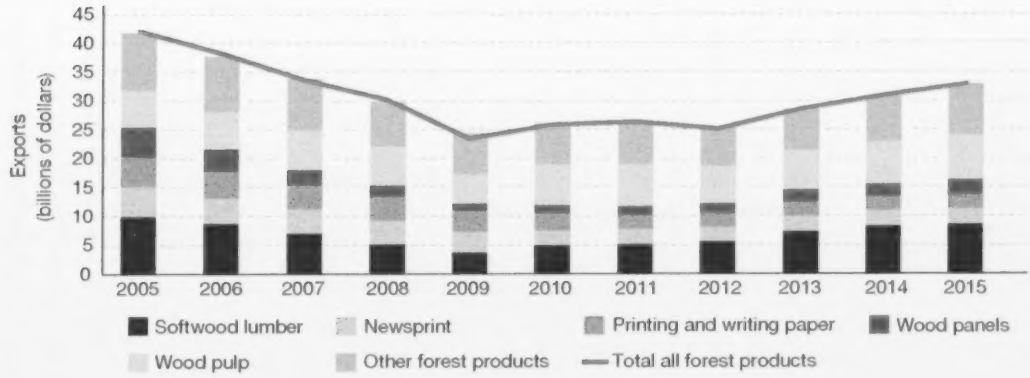
On the wood product side, the U.S. housing recovery continued to drive Canadian softwood lumber exports. In 2015, softwood lumber exports totalled $8.6 billion, a 3% increase over 2014. The value of wood panel exports increased by 18%, to $2.68 billion, with significant increases in all panel types, especially plywood (29%) and fibreboard (28%).

As for pulp and paper, wood pulp exports increased 6.5% over 2014 levels, to $7.7 billion. In 2015, exports of printing and writing paper barely grew (by 1%), while newsprint exports fell 10% from the previous year.

What is the outlook?

Newsprint and printing and writing paper exports are in long-term decline, resulting from the rise of electronic media, but a weaker Canadian dollar continues to support Canadian producers, especially in the U.S. market.

Exports of Canadian forest products, 2005–2015



Source: Statistics Canada. See *Sources and information* for more detail.

How is the forest industry changing?

Changing markets

Over the past decade, Canada's forest industry has weathered a deep cyclical decline in demand and structural changes in global paper markets as electronic media has pervaded daily life around the world.

The forest industry responded to these challenges in traditional markets by developing new and innovative products, materials and services, such as new building materials and biochemicals that can be used to produce biobased pharmaceuticals, biodegradable plastics, personal care products and industrial chemicals. This shift positions the forest sector to meet growing demand for environment-conscious products and processes.

Finding new ways to use wood fibre and to maximize the value derived from wood will be crucial to industry performance and its contribution to the green economy.

Changing industry structure

Over the past decade, the Canadian industry has adapted to changes in both end-use markets and fundamental drivers of the global forest sector. As in other industries, there has been increased global integration through trade and multinational firms. Canadian industry consolidated and firms refocused business lines. Canadian firms also acquired more assets in the U.S. to capture investment opportunities, driven in large part by a shift in the global concentration of fibre, from the slow-growing wood of northern regions to the fast-growing wood of southern regions. The sector structure has shifted from Canadian companies in North American markets to North American companies in global markets.

Within Canada, the impact of these changes has varied among regions. The east, where pulp and paper production has historically been concentrated, was the hardest hit by shrinking paper markets. Western provinces are more focused on wood products, and have therefore been recovering faster than eastern provinces. In addition to its different industrial profile, western Canada has a location advantage, with better access to growing offshore markets in Asia. This regional divergence is expected to continue, given the varying outlooks of sub-sectors (negative for most paper products and positive for wood products).

Improving environmental performance

While developing innovative and environment-conscious bioproducts, the forest sector has invested in technologies to reduce its environmental impacts. As a result, the sector drastically cut carbon emissions and energy use. Between 2000 and 2013, direct greenhouse gas (GHG) emissions by the sector fell by 44% and total energy use declined 29%. This is attributed in part to producers generating more power internally from "waste" products such as pulping liquor and wood residues.

Investments in technologies that reduce energy use and GHG emissions are expected to continue. The Government of Canada has been actively supporting this transition toward a greener industry through programs like Investments in Forest Industry Transformation.

Source: See *Sources and information* for more detail.

Indicator: Financial performance

Why is this indicator important?

Good financial performance is essential for attracting investment that will allow the Canadian forest industry to remain competitive in the long term while maintaining the economic sustainability of local communities. Financial performance includes two key measurements: operating profits and return on capital employed. High operating profits show that the business activity of the industry is in good health, and return on capital employed indicates the efficiency of capital usage by the industry.

What has changed and why?

The Canadian forest industry's financial performance remained solid in 2015, with operating profit standing at $2.6 billion, up 5% over 2014. This is the highest operating profit since 2005, representing a significant improvement on the weak financial performance of 2011 and 2012. Similarly, the return on capital employed increased to 5.7% in 2015, compared with 4.4% in 2014. This is well above the long-term average of the past 10 years (3.5%).

The solid financial performance of 2015 was due in part to the weak Canadian dollar, which significantly benefited Canadian exporters, and improved market conditions for some of the sector's major commodities, such as lumber and panel boards.

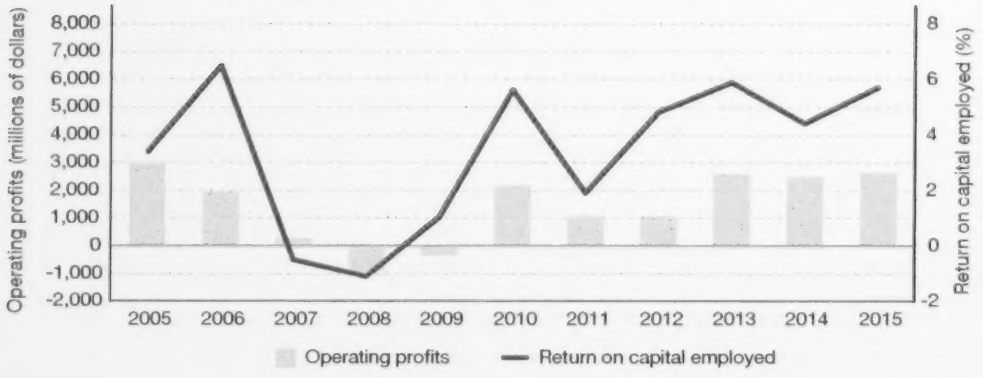
What is the outlook?

North American and overseas wood product markets are likely to continue to improve in the short and medium term, with a positive impact on the financial performance of the forest industry.

The weaker Canadian dollar will continue to cushion the negative impacts of falling demand for some products, especially newsprint, enhancing the Canadian forest industry's competitiveness in the global marketplace. Better financial performance will enable the Canadian forest industry to make much-needed strategic investments, and therefore further improve efficiency in the future.

The fourth quarter of 2015 was the 16th consecutive quarter with positive operating profits for the Canadian forest industry. The highest operating profits since 2005 were also recorded in 2015.

Financial performance by Canada's forest industry, 2005–2015



Source: Statistics Canada, Quarterly financial statistics for enterprises. See *Sources and information* for more detail.

Indicator: Secondary manufacturing

Why is this indicator important?

Secondary wood and paper product manufacturing uses lumber and paper to make intermediate and final products and generates additional employment and revenue, with a corresponding increase in the contribution made by the forest industry to the Canadian economy.

What has changed and why?

In 2015, the secondary wood and paper product industries in Canada generated over $6.1 billion in real gross domestic product (GDP). This was a small decline from 2014 and 20% less than the high achieved in 2004. The percentage of the total forest product GDP derived from secondary manufacturing stood at 36% in 2015.

Although the secondary manufacturing sub-sector has declined, it has been relatively more stable than the primary manufacturing sub-sector, mainly because of its focus on domestic Canadian markets and less exposure to the U.S. and other foreign markets.

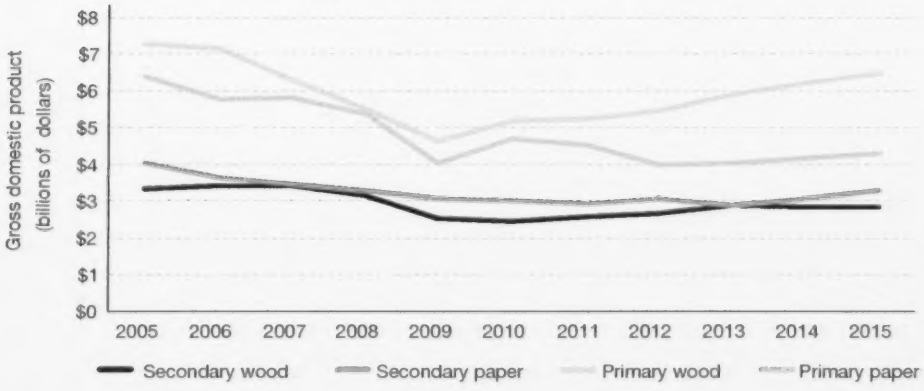
The secondary manufacturing of paper products began to decline in 2003, largely because of falling paper consumption in North America and because of broader global trends, such as relocation of global manufacturing to developing countries.

The secondary wood manufacturing sub-sector began to decline in 2004, undermined at first by the strengthening Canadian dollar and then by the U.S. housing recession and the broader world recession that followed.

What is the outlook?

A stable outlook for secondary paper products demand is expected, given steady growth of the North American economy and despite continuing trends toward electronic technology adoption, shifts in global manufacturing and trade, and the ongoing paper and packaging conservation efforts in North America. A positive outlook for secondary wood products is expected, as the U.S. housing market continues to expand and overall steady growth continues in the North American economy. Competition from low-cost producers remains a threat in some markets, requiring continued efforts by Canada's forest industry to develop new wood-fibre-based value-added products and to expand into new and traditional markets.

Gross domestic product from primary and secondary wood and paper product industries, 2005–2015



Source: Statistics Canada. See *Sources and information* for more detail.

Indicator: Forest industry carbon emissions

Why is this indicator important?

Scientists agree that there is a strong link between climate change and activities that burn fossil fuels and emit carbon dioxide, methane, nitrous oxide and other greenhouse gases (GHG). Monitoring the forest industry's GHG emissions is a necessary step in continuing to improve its emissions record. As well, Canada annually measures its national emission levels for all sectors and assesses how these compare with targets for GHG reductions.

What has changed and why?

A changing energy mix, greater energy efficiency and the decline in the Canadian pulp and paper manufacturing sub-sector have clearly reduced energy use and GHG emissions in the forest industry. The forest industry's substantial cut in fossil fuel use between 2000 and 2013 helped reduce direct emissions by 44% and total energy use by 29%. The forest sector's ability to generate its own electricity, largely from bioenergy, has reduced its reliance on fossil fuels. The sector's overall decrease in GHG emissions resulted from its ability to change fuels as needed, along with increased energy efficiency and reduced energy use during the global economic recession.

Some of this decline can be attributed to the contraction of the forest industry between 2005 and 2009. A large part of it, however, is a result of changing energy usage and increases in generation of power from waste wood.

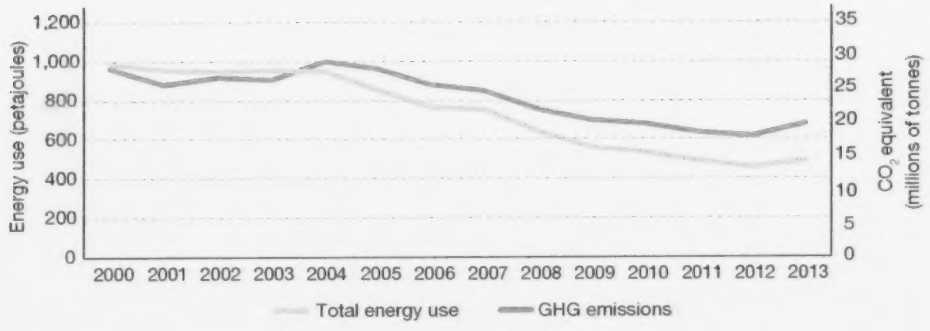
What is the outlook?

Investments in technologies that reduce energy use and GHG emissions are expected to continue. These technologies have significant environmental benefits and reduce energy costs for manufacturers. However, the expected rebound in economic activity will somewhat temper efficiency gains on overall GHG emissions. As a result, GHG emissions and total energy use will likely continue to decline, but at a slower rate.

Bioenergy accounted for 60% of forest industry energy use in 2013, up from 49% in 2000.

The forest industry's reduced use of refined petroleum products and natural gas between 2000 and 2013 accounted for 95% of its reduction in direct emissions over the same period.

Fossil fuel greenhouse gas (GHG) emissions and total energy use in Canada's forest industry, 2000–2013



Source: Statistics Canada. See *Sources and information* for more detail.

Statistical profiles

Canada

Population (April 2016)	36,155,487
Arboreal emblem	Maple
FOREST INVENTORY	
Forest area by classification (hectares)	
Forest land	347,069,000
Other wooded land	40,865,660
Other land with tree cover	8,498,940
Total area	396,433,600
Forest area change (hectares, 2014)	
Afforestation	Not available
Deforestation	34,200
Forest type (forest land only)	
Coniferous	67.8%
Mixedwood	15.8%
Broadleaf	10.5%
Temporarily non-treed	5.9%
Forest ownership	
Provincial	76.6%
Territorial	12.9%
Private	6.2%
Aboriginal	2.0%
Federal	1.6%
Municipal	0.3%
Other	0.4%
Growing stock (million cubic metres)	
Total volume	47,320
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	20,307,538
Fire (2015)	
Area burned (hectares)	3,903,276
Number of fires	7,068

FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	717,059
Volume harvested (cubic metres)	153,065,000
Regeneration (hectares, 2014)	
Area planted	399,076
Area seeded	11,961
Third-party certification (hectares, 2015)	
Area certified	166,163,538
Protected forest (IUCN categories)	
I a Strict nature reserve	0.1%
I b Wilderness area	1.9%
II Ecosystem conservation and protection	4.2%
III Conservation of natural features	0.5%
IV Conservation through active management	0.2%
V Landscape conservation and recreation	0.02%
GREENHOUSE GAS INVENTORY	
For forest lands affected by land-use change (2014)	
Removals from the atmosphere due to afforestation (CO_2e/yr, megatonnes)	0.6
Total emissions due to deforestation (CO_2e/yr, megatonnes)	10.0
For managed forests (2014)	
Area of managed forests (hectares)	232,000,000
Net removals due to forest biomass and dead organic matter (CO_2e/yr, megatonnes)	159.6
Net emissions to the atmosphere (CO_2e/yr, megatonnes)	70.6

DOMESTIC ECONOMIC IMPACT	
Canadian housing starts (2015)	195,535
Contribution to nominal GDP (current dollars, 2015)	
Forestry and logging industry	4,545,466,000
Pulp and paper product manufacturing industry	8,624,847,000
Wood product manufacturing industry	8,977,177,000
Total contribution to nominal GDP	22,147,490,000
Contribution to real GDP (constant 2007 dollars, 2015)	
Forestry and logging industry	4,460,000,000
Pulp and paper product manufacturing industry	7,447,000,000
Wood product manufacturing industry	9,401,000,000
Total contribution to real GDP	21,308,000,000
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	9,305,302,000
Pulp and paper product manufacturing industry	24,489,870,000
Wood product manufacturing industry	26,535,262,000
Total revenue from goods manufactured	60,330,434,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	259,308
Survey of Employment, Payrolls and Hours	187,531
Canadian System of National Accounts	201,645
Direct and indirect employment	296,691
Wages and salaries (dollars, 2014)	
Forestry and logging industry	1,543,055,000
Pulp and paper manufacturing industry	3,495,150,000
Wood product manufacturing industry	4,433,585,000
Total wages and salaries	9,471,790,000
TRADE	
Balance of trade (total exports, dollars, 2015)	21,539,162,600
Value of exports (dollars, 2015)	
Primary wood products	1,204,355,252
Pulp and paper products	17,771,873,955
Wood-fabricated materials	13,737,361,262
Total value of exports	32,713,590,469
Value of imports (dollars, 2015)	
Primary wood products	595,600,516
Pulp and paper products	7,329,467,502
Wood-fabricated materials	3,249,359,851
Total value of imports	11,174,427,869

DOMESTIC PRODUCTION AND INVESTMENT	
Production (2015)	
Hardwood lumber (cubic metres)	1,754,400
Softwood lumber (cubic metres)	62,974,400
Newsprint (tonnes)	3,500,000
Printing and writing paper (tonnes)	3,041,000
Wood pulp (tonnes)	16,841,000
Structural panels (plywood and oriented strandboard, cubic metres)	7,966,755
Capital expenditures (dollars, 2015)	
Forestry and logging industry	412,000,000
Pulp and paper product manufacturing industry	998,700,000
Wood product manufacturing industry	1,269,700,000
Total capital expenditures	2,680,400,000
Repair expenditures (dollars, 2014)	
Forestry and logging industry	513,800,000
Pulp and paper product manufacturing industry	1,265,200,000
Wood product manufacturing industry	912,300,000
Total repair expenditures	2,691,300,000
DOMESTIC CONSUMPTION	
Consumption (2015)	
Hardwood lumber (cubic metres)	4,193,437
Softwood lumber (cubic metres)	24,617,991
Newsprint (tonnes)	658,850
Printing and writing paper (tonnes)	1,093
Wood pulp (tonnes)	7,341,670
Structural panels (plywood and oriented strandboard, cubic metres)	3,271,475

See page 67 for background information and sources for the statistics presented in these tables.

British Columbia

Population (April 2016)	4,720,932
Arboreal emblem	Western redcedar
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	11,078,885
Fire (2015)	
Area burned (hectares)	280,445
Number of fires	1,836
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	167,238
Volume harvested (cubic metres)	66,500,000
Regeneration (hectares, 2014)	
Area planted	166,790
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	52,486,426
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	31,446
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	4,796,231,000
Pulp and paper product manufacturing industry	4,618,679,000
Wood product manufacturing industry	10,263,989,000
Total revenue from goods manufactured	19,678,899,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	65,492
Survey of Employment, Payrolls and Hours	51,793
Canadian System of National Accounts	53,790
Wages and salaries (dollars, 2014)	
Forestry and logging industry	755,567,000
Pulp and paper product manufacturing industry	682,294,000
Wood product manufacturing industry	1,464,130,000
Total wages and salaries	2,901,991,000
TRADE	
Balance of trade (total exports, dollars, 2015)	10,846,936,327
Value of domestic exports (dollars, 2015)	
Primary wood products	971,477,093
Pulp and paper products	4,365,228,634
Wood-fabricated materials	7,389,089,994
Total value of domestic exports	12,725,795,721
Value of imports (dollars, 2015)	
Primary wood products	67,630,685
Pulp and paper products	866,592,020
Wood-fabricated materials	944,636,689
Total value of imports	1,878,859,394

Alberta

Population (April 2016)	4,249,842
Arboreal emblem	Lodgepole pine
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	3,634,882
Fire (2015)	
Area burned (hectares)	492,536
Number of fires	1,850
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	83,786
Volume harvested (cubic metres)	23,037,000
Regeneration (hectares, 2014)	
Area planted	57,605
Area seeded	753
Third-party certification (hectares, 2015)	
Area certified	21,658,196
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	37,282
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	835,647,000
Pulp and paper product manufacturing industry	1,688,373,000
Wood product manufacturing industry	3,615,112,000
Total revenue from goods manufactured	6,139,132,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	19,617
Survey of Employment, Payrolls and Hours	17,427
Canadian System of National Accounts	15,545
Wages and salaries (dollars, 2014)	
Forestry and logging industry	177,457,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	670,072,000
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	2,650,308,092
Value of domestic exports (dollars, 2015)	
Primary wood products	27,137,747
Pulp and paper products	1,921,941,809
Wood-fabricated materials	1,056,021,291
Total value of domestic exports	3,005,100,847
Value of imports (dollars, 2015)	
Primary wood products	5,568,041
Pulp and paper products	194,006,750
Wood-fabricated materials	155,217,964
Total value of imports	354,792,755

Saskatchewan

Population (April 2016)	1,146,655
Arboreal emblem	White birch
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	304,176
Fire (2015)	
Area burned (hectares)	1,758,376
Number of fires	723
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	17,701
Volume harvested (cubic metres)	3,717,000
Regeneration (hectares, 2014)	
Area planted	2,252
Area seeded	55
Third-party certification (hectares, 2015)	
Area certified	5,195,176
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	5,149
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	117,043,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	433,789,000
Total revenue from goods manufactured	Not available
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	3,458
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	17,912,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	360,988,387
Value of domestic exports (dollars, 2015)	
Primary wood products	3,241,362
Pulp and paper products	167,901,276
Wood-fabricated materials	260,954,080
Total value of domestic exports	432,096,718
Value of imports (dollars, 2015)	
Primary wood products	1,016,993
Pulp and paper products	33,259,589
Wood-fabricated materials	36,831,749
Total value of imports	71,108,331

Manitoba

Population (April 2016)	1,308,912
Arboreal emblem	White spruce
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	909,830
Fire (2015)	
Area burned (hectares)	47,358
Number of fires	454
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	10,686
Volume harvested (cubic metres)	1,496,000
Regeneration (hectares, 2014)	
Area planted	4,092
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	11,353,347
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	5,501
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	60,097,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	414,004,000
Total revenue from goods manufactured	Not available
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	8,117
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	14,551,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	-116,776,697
Value of domestic exports (dollars, 2015)	
Primary wood products	637,203
Pulp and paper products	264,231,860
Wood-fabricated materials	126,637,804
Total value of domestic exports	391,506,867
Value of imports (dollars, 2015)	
Primary wood products	3,732,986
Pulp and paper products	324,016,958
Wood-fabricated materials	180,533,620
Total value of imports	508,283,564

Ontario

Population (April 2016)	13,920,499
Arboreal emblem	Eastern white pine
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	610,091
Fire (2015)	
Area burned (hectares)	39,311
Number of fires	668
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	117,230
Volume harvested (cubic metres)	13,966,000
Regeneration (hectares, 2014)	
Area planted	67,369
Area seeded	11,113
Third-party certification (hectares, 2015)	
Area certified	24,839,080
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	70,156
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	928,168,000
Pulp and paper product manufacturing industry	7,211,585,000
Wood product manufacturing industry	3,704,612,000
Total revenue from goods manufactured	11,844,365,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	57,617
Survey of Employment, Payrolls and Hours	37,739
Canadian System of National Accounts	44,795
Wages and salaries (dollars, 2014)	
Forestry and logging industry	151,326,000
Pulp and paper product manufacturing industry	1,209,124,000
Wood product manufacturing industry	723,843,000
Total wages and salaries	2,084,293,000
TRADE	
Balance of trade (total exports, dollars, 2015)	-1,379,158,016
Value of domestic exports (dollars, 2015)	
Primary wood products	49,513,321
Pulp and paper products	2,933,995,403
Wood-fabricated materials	1,411,781,549
Total value of domestic exports	4,395,290,273
Value of imports (dollars, 2015)	
Primary wood products	62,612,023
Pulp and paper products	4,395,305,599
Wood-fabricated materials	1,316,530,667
Total value of imports	5,774,448,289

Quebec

Population (April 2016)	8,310,708
Arboreal emblem	Yellow birch
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	3,397,662
Fire (2015)	
Area burned (hectares)	5,380
Number of fires	384
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	205,859
Volume harvested (cubic metres)	28,430,000
Regeneration (hectares, 2014)	
Area planted	73,344
Area seeded	40
Third-party certification (hectares, 2015)	
Area certified	43,651,083
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	37,926
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	1,889,565,000
Pulp and paper product manufacturing industry	7,830,986,000
Wood product manufacturing industry	6,564,888,000
Total revenue from goods manufactured	16,285,439,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	84,858
Survey of Employment, Payrolls and Hours	59,053
Canadian System of National Accounts	62,275
Wages and salaries (dollars, 2014)	
Forestry and logging industry	288,163,000
Pulp and paper product manufacturing industry	980,004,000
Wood product manufacturing industry	1,117,075,000
Total wages and salaries	2,385,242,000
TRADE	
Balance of trade (total exports, dollars, 2015)	6,991,177,716
Value of domestic exports (dollars, 2015)	
Primary wood products	82,556,665
Pulp and paper products	6,323,676,981
Wood-fabricated materials	2,829,053,013
Total value of domestic exports	9,235,286,659
Value of imports (dollars, 2015)	
Primary wood products	373,110,873
Pulp and paper products	1,333,589,062
Wood-fabricated materials	537,409,008
Total value of imports	2,244,108,943

New Brunswick

Population (April 2016)	755,868
Arboreal emblem	Balsam fir
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	4,700
Fire (2015)	
Area burned (hectares)	262
Number of fires	222
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	72,085
Volume harvested (cubic metres)	10,168,000
Regeneration (hectares, 2014)	
Area planted	17,576
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	4,185,080
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	1,995
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	495,812,000
Pulp and paper product manufacturing industry	1,742,434,000
Wood product manufacturing industry	1,073,109,000
Total revenue from goods manufactured	3,311,355,000
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	11,992
Survey of Employment, Payrolls and Hours	9,653
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	87,017,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	1,413,430,778
Value of domestic exports (dollars, 2015)	
Primary wood products	43,945,450
Pulp and paper products	1,103,239,115
Wood-fabricated materials	553,068,393
Total value of domestic exports	1,700,252,958
Value of imports (dollars, 2015)	
Primary wood products	81,838,535
Pulp and paper products	153,946,954
Wood-fabricated materials	51,036,691
Total value of imports	286,822,180

Nova Scotia

Population (April 2016)	947,284
Arboreal emblem	Red spruce
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	533
Fire (2015)	
Area burned (hectares)	517
Number of fires	247
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	32,187
Volume harvested (cubic metres)	3,643,000
Regeneration (hectares, 2014)	
Area planted	5,038
Area seeded	Not applicable
Third-party certification (hectares, 2015)	
Area certified	1,301,299
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	3,825
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	105,549,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	388,845,000
Total revenue from goods manufactured	Not available
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	5,492
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	28,312,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	629,793,474
Value of domestic exports (dollars, 2015)	
Primary wood products	25,834,769
Pulp and paper products	547,873,714
Wood-fabricated materials	105,778,115
Total value of domestic exports	**679,486,598**
Value of imports (dollars, 2015)	
Primary wood products	39,970
Pulp and paper products	22,879,493
Wood-fabricated materials	26,773,661
Total value of imports	49,693,124

Prince Edward Island

Population (April 2016)	147,390
Arboreal emblem	Red oak
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	75
Fire (2015)	
Area burned (hectares)	2
Number of fires	5
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	2,760
Volume harvested (cubic metres)	371,000
Regeneration (hectares, 2014)	
Area planted	282
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	446
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	558
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	7,415,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total revenue from goods manufactured	Not available
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	750
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	1,009,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	21,209,720
Value of domestic exports (dollars, 2015)	
Primary wood products	4,782
Pulp and paper products	21,148,231
Wood-fabricated materials	98,938
Total value of domestic exports	21,251,951
Value of imports (dollars, 2015)	
Primary wood products	25,262
Pulp and paper products	16,200
Wood-fabricated materials	769
Total value of imports	42,231

Newfoundland and Labrador

Population (April 2016)	528,448
Arboreal emblem	Black spruce
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	12,033
Fire (2015)	
Area burned (hectares)	3,958
Number of fires	128
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	7,037
Volume harvested (cubic metres)	1,696,000
Regeneration (hectares, 2014)	
Area planted	4,728
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	1,493,405
DOMESTIC ECONOMIC IMPACT	
Housing starts (2015)	1,697
Revenue from goods manufactured (dollars, 2014)	
Forestry and logging industry	68,881,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total revenue from goods manufactured	Not available
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2015)	
Labour Force Survey	1,908
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2014)	
Forestry and logging industry	21,537,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	Not available
Total wages and salaries	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	120,865,001
Value of domestic exports (dollars, 2015)	
Primary wood products	6,860
Pulp and paper products	122,618,574
Wood-fabricated materials	4,499,659
Total value of domestic exports	**127,125,093**
Value of imports (dollars, 2015)	
Primary wood products	25,148
Pulp and paper products	5,849,153
Wood-fabricated materials	385,791
Total value of imports	6,260,092

Yukon

Population (April 2016)	37,294
Arboreal emblem	Subalpine fir
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	6,232
Fire (2015)	
Area burned (hectares)	169,841
Number of fires	184
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	300
Volume harvested (cubic metres)	23,000
Regeneration (hectares, 2014)	
Area planted	Not available
Area seeded	Not available
Third-party certification (hectares, 2015)	
Area certified	Not available
TRADE	
Balance of trade (total exports, dollars, 2015)	332,935
Value of domestic exports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	341,901
Total value of domestic exports	341,901
Value of imports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	5,724
Wood-fabricated materials	3,242
Total value of imports	8,966

Northwest Territories

Population (April 2016)	44,340
Arboreal emblem	Tamarack
DISTURBANCE	
Insects (hectares, 2014)	
Area defoliated by insects and containing beetle-killed trees	348,439
Fire (2015)	
Area burned (hectares)	646,955
Number of fires	245
FOREST MANAGEMENT	
Harvesting (2014)	
Area harvested (hectares)	190
Volume harvested (cubic metres)	17,000
Regeneration (hectares, 2014)	
Area planted	0
Area seeded	0
Third-party certification (hectares, 2015)	
Area certified	0
TRADE	
Balance of trade (total exports, dollars, 2015)	12,831
Value of domestic exports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	12,831
Wood-fabricated materials	0
Total value of domestic exports	12,831
Value of imports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	0
Total value of imports	0

Nunavut

Population (April 2016)	37,315
TRADE	
Balance of trade (total exports, dollars, 2015)	42,052
Value of domestic exports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	5,527
Wood-fabricated materials	36,525
Total value of domestic exports	42,052
Value of imports (dollars, 2015)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	0
Total value of imports	0

Sources and information

The data in this report are derived from a number of sources, which are identified here by their relevant section. Where necessary, data have been edited for accuracy and consistency. All data are subject to revision.

In most cases, the data represent the year before the reporting period. However, when they are gathered from several sources, it takes longer to analyze and produce them. In these cases, the numbers reflect results from two or three years before the reporting period.

While most figures are calculated for the calendar year, some are based on the federal government's fiscal year (April 1 to March 31). Numbers are rounded off. In the case of employment data, they are rounded to the nearest hundred. All dollar figures, unless specified otherwise, are in Canadian dollars.

It may not be possible to compare directly the data from the various sections, as they come from several sources that may compile their statistics differently from each other.

Dates on which data were accessed online are now included for the Food and Agriculture Organization of the United Nations, the National Forest Inventory, the National Forestry Database, the Canadian Interagency Forest Fire Centre, and Statistics Canada.

Sustainability indicators

Introduction

Note

- Additional information can be found at:
- The Montréal Process Working Group. *The Montréal Process: Criteria and Indicators for the Conservation and Management of Temperate and Boreal Forests*. http://www.montrealprocess.org/Resources/Criteria_and_Indicators/index.shtml

How much forest does Canada have?

Sources

- Food and Agriculture Organization of the United Nations. 2012. *FRA 2015: Terms and Definitions*. Forest Resources Assessment Working Paper 180. Rome, Italy. http://www.fao.org/docrep/017/ap862e/ap862e00.pdf (June 28, 2016)
- National Forest Inventory. Standard reports, Table 4.0, Area (1000 ha) of forest and non-forest land in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T4_FOR_AREA_en.html (May 13, 2016)

Notes

- The base estimate of forest area for Canada comes from the National Forest Inventory (NFI) baseline report, available at https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T4_FOR_AREA_en.html
- The estimate of current forest area (2015) was calculated by taking the NFI baseline estimate at the source above and adjusting it for known increases in forest area (afforestation) and known decreases in forest area (deforestation) that occurred during the time since the NFI baseline data were collected. These adjustments are described in Canada's country report to the United Nations Food and Agriculture Organization for the 2015 Global Forest Resources Assessment, available at http://www.fao.org/documents/card/en/c/8202f908-3990-4321-a2b4-a2e346dbf68c/
- The Food and Agriculture Organization of the United Nations definition of "forest" and other terms are provided in *FRA 2015: Terms and Definitions* at http://www.fao.org/documents/card/en/c/5d917495-a5de-5b0c-851a-c0010269d79d/

Indicator: Forest area

Sources

See notes listed within notes for "How much forest area does Canada have?".

Note

- Additional information can be found at:
    - Johnston, M., Campagna, M., et al. 2009. *Vulnerability of Canada's tree species to climate change and management options for adaptation: An overview for policy makers and practitioners*. Ottawa, ON: Canadian Council of Forest Ministers. http://cfs.nrcan.gc.ca/publications?id=30276
    - Natural Resources Canada–Canadian Forest Service. Changing climate, changing forest zones. http://www.nrcan.gc.ca/forests/climate-change/impacts/13093
    - Price, D.T., Alfaro, R.I., et al. 2013. Anticipating the consequences of climate change for Canada's boreal forest ecosystems. *Environmental Reviews* 21, 322–365. http://cfs.nrcan.gc.ca/publications?id=35306

Indicator: Deforestation and afforestation

Source

- Environment and Climate Change Canada. 2016. *National Inventory Report 1990–2014: Greenhouse gas sources and sinks in Canada*. https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=662F9C56-1

Notes

- National deforestation estimates are calculated on a periodic basis using the method described in the national deforestation monitoring system description report. Deforestation estimates by sector for 2015 will be available in the indicator table in *The State of Canada's Forests* report after 2017. For more information, see:
    - Dyk, A., Leckie, D., et al. 2015. *Canada's national deforestation monitoring system: System description*. Victoria, BC: Natural Resources Canada–Canadian Forest Service. http://cfs.nrcan.gc.ca/publications?id=36042
- Environment and Climate Change Canada, 2016, *National Inventory Report*, is based on Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- All values reported are for the listed year.
- Values were updated with new mapping, affecting estimates from 2004 onward.
- Forestry numbers result from the creation of permanent forestry access roads.
- Hydroelectric numbers exclude reservoirs. Refer to the indicator text for magnitudes of deforestation due to reservoir flooding.
- Industry and transportation numbers include mines, gravel pits, oil and gas infrastructure, and highway construction.
- Peat mines have been removed, as they were incorrectly reported in the past and are below 100 hectares/year.
- Municipal numbers include urban development.
- Recreation numbers include ski hills and golf courses.
- Total numbers are adjusted for rounding.

Indicator: Wood volume

Sources

- National Forestry Database. Wood supply – National tables, Table 2.1, Wood supply by ownership, latest period calculated, 2014. http://nfdp.ccfm.org/data/graphs/graph_21_b_e.php (April 8, 2016)
- National Forestry Database. Wood supply – Quick facts, Annual harvest versus wood supply, 1990–2014. http://nfdp.ccfm.org/supply/quick_facts_e.php (April 8, 2016)
- National Forest Inventory. Standard reports, Table 15.0 and 16.0, Total tree volume (million m^3) on forest type and age class in Canada, and Total tree volume (million m^3) by species group and age class in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T15_FORAGE20_VOL_en.html and https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T16_LSAGE20_VOL_en.html (April 8, 2016)

Note

- Additional information on outlook for wood volume is available at:
    - Gauthier, S., Bernier, P.Y., et al. 2015. Vulnerability of timber supply to projected changes in fire regime in Canada's managed forests. *Canadian Journal of Forest Research* 45, 1439–1447. http://cfs.nrcan.gc.ca/publications?id=36169
    - Gauthier, S., Bernier, P., et al. 2015. Boreal forest health and global change. *Science* 349, 819–822. http://cfs.nrcan.gc.ca/publications?id=36186
    - Girardin, M.P., Hogg, E.H., et al. 2016. Negative impacts of high temperatures on growth of black spruce forests intensify with the anticipated climate warming. *Global Change Biology* 22, 627–643. http://cfs.nrcan.gc.ca/publications?id=36216
    - Hember, R.A., Kurz, W.A., et al. 2012. Accelerating regrowth of temperate-maritime forests due to environmental change. *Global Change Biology* 18, 2026–2040. http://cfs.nrcan.gc.ca/publications?id=33995

Is timber being harvested sustainably?

Sources

- National Forest Inventory. Standard reports, Table 16.1, Total tree volume by species group, age class and terrestrial ecozone in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/NFI3_T16_LSAGE20_VOL_en.html (May 13, 2016)
- National Forestry Database. Wood supply – Quick facts, Annual harvest versus wood supply, 1990–2014. http://nfdp.ccfm.org/supply/quick_facts_e.php (May 13, 2016)
- National Forestry Database. Wood supply – National tables, Table 2.1, Wood supply by ownership, latest period calculated, 2014. http://nfdp.ccfm.org/data/graphs/graph_21_b_e.php (May 13, 2016)

Note

- British Columbia accounts for 40% of Canada's aggregated allowable annual cut (AAC). Quebec and Ontario together account for 31%, and the Prairie provinces and the Atlantic region for 25% and 4%, respectively.

Indicator: Area harvested

Source

- National Forestry Database. Silviculture – National tables, Table 6.2, Area harvested by ownership, harvesting method and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_62e.html (May 13, 2016)

Notes

- Data include provincial Crown and private forest land subject to even-aged management (clearcutting), uneven-aged management (selection cutting), and commercial thinning harvest methods.
- Graph does not display federal lands because their small area cannot be represented at the given scale.

Indicator: Regeneration

Sources

- National Forestry Database. Silviculture – National tables, Table 6.2, Area harvested by ownership, harvesting method and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_62e.html (April 25, 2016)
- National Forestry Database. Silviculture – National tables, Table 6.6, Area of direct seeding by ownership and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_66e.html (April 25, 2016)
- National Forestry Database. Silviculture – National tables, Table 6.7, Area planted by ownership, species, and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_67e.html (April 25, 2016)

Notes

- Data are for forests on provincial Crown lands across Canada.
- Federally and privately owned lands are excluded.

Indicator: Volume harvested relative to the sustainable wood supply

Source

- National Forestry Database. Wood supply – Quick facts, Annual harvest versus wood supply, 1990–2014. http://nfdp.ccfm.org/supply/quick_facts_e.php (May 13, 2016)

Notes

- Harvests include industrial roundwood only and exclude fuel wood and firewood.
- Wood supply includes allowable annual cuts (AACs) for provincial Crown lands and potential harvests for federal and private lands.

How does disturbance shape Canada's forests?

Sources

- Boulanger, Y., Gauthier, S., et al. 2014. A refinement of models projecting future Canadian fire regimes using homogeneous fire regime zones. *Canadian Journal of Forest Research* 44, 365–376. http://cfs.nrcan.gc.ca/publications?id=35420
- Gauthier, S., Bernier, P.Y., et al. 2014. Climate change vulnerability and adaptation in the managed Canadian boreal forest. *Environmental Reviews* 22, 256–285. http://cfs.nrcan.gc.ca/publications?id=35357
- Gauthier, S., Bernier, P., et al. 2015. Boreal forest health and global change. *Science* 349, 819–822. http://cfs.nrcan.gc.ca/publications?id=36186
- Régnière, J., St-Amant, R., et al. 2012. Predicting insect distributions under climate change from physiological responses: Spruce budworm as an example. *Biological Invasions* 14, 1571–1586. http://cfs.nrcan.gc.ca/publications?id=33992

Indicator: Forest diseases

Sources

- Ennos, R.A. 2015. Resilience of forests to pathogens: An evolutionary ecology perspective. *Forestry* 88, 41–52. http://forestry.oxfordjournals.org/content/88/1/41.abstract
- Price, D.T., Alfaro, R.I., et al. 2013. Anticipating the consequences of climate change for Canada's boreal forest ecosystems. *Environmental Reviews* 21, 322–365. http://cfs.nrcan.gc.ca/publications?id=35306
- Ramsfield, T.D., Bentz, B.J., et al. 2016. Forest health in a changing world: Effects of globalization and climate change on forest insect and pathogen impacts. *Forestry* 89, 245–252. http://cfs.nrcan.gc.ca/publications?id=36754
- Sturrock, R.N., Frankel, S.J., et al. 2011. Climate change and forest diseases. *Plant Pathology* 60, 133–149. http://cfs.nrcan.gc.ca/publications?id=32075
- Woods, A.J., Martín-García, J., et al. 2016. Dothistroma needle blight, weather and possible climatic triggers for the disease's recent emergence. *Forest Pathology*. http://onlinelibrary.wiley.com/doi/10.1111/efp.12248/abstract

Indicator: Forest insects

Source

- National Forestry Database. Forest insects – National tables, Table 4.1, Area within which moderate to severe defoliation occurs including area of beetle-killed trees by insects and province/territory, 1975–2015. http://nfdp.ccfm.org/data/compendium/html/comp_41e.html (April 13, 2016)

Notes

- The area disturbed by mountain pine beetle includes only British Columbia.
- Forest area disturbed by defoliators includes only areas with tree mortality and moderate to severe defoliation. Defoliation does not always imply mortality. For example, stands with moderate defoliation often recover and may not lose much growth.
- Defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one species at a time. This may result in double or triple counting in areas affected by more than one species, exaggerating the extent of the total area defoliated.

Indicator: Forest fires

Sources

- Canadian Interagency Forest Fire Centre. 2015. *Canada Report 2015*. http://www.ciffc.ca/images/stories/docs/2015%20canada%20report.pdf (June 23, 2016)
- National Forestry Database. Forest fires – National tables, Table 3.1, Forest fire statistics by province/territory/agency, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_31e.html (May 16, 2016)

Note

- Forest fires in Canada (infographic) – National parks fire data are not included in the provincial and territorial fire data.

Indicator: Carbon emissions and removals

Source

- Environment Canada. 2016. *National Inventory Report 1990–2014: Greenhouse gas sources and sinks in Canada*. https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=662F9C56-1

Notes

- This indicator is estimated annually using Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System. The system integrates information about forest inventories, forest growth, natural disturbances, forest management activities and land-use change to evaluate carbon stocks, stock changes and emissions of non-CO_2 greenhouse gases in Canada's managed forests. The system also estimates transfers to the forest product sector and the fate of harvested wood products manufactured from wood harvested in Canada, including emissions resulting from these products.
- "Managed land" includes all lands managed for production of wood fibre or wood-based bioenergy, for protection from natural disturbances, or for the conservation of ecological values. Within those managed lands, "forest" includes all areas of 1 hectare or more having the potential to develop forest cover, with a minimum crown closure of 25% and a minimum tree height of 5 metres at maturity in situ.
- Insect-affected areas shown in the figure include only those areas affected with enough severity to have a substantial impact on national forest carbon emissions and removals.
- Harvested wood product emissions are estimated using the "Production Approach" of the Intergovernmental Panel on Climate Change (IPCC) and include annual emissions from all wood harvested in Canada since 1961, regardless of its current location. Transfers of wood and paper products to landfills are assumed to instantly oxidize as CO_2.
- The results reported here differ from those of Canada's Greenhouse Gas Inventory reporting, which, starting in 2015, includes emissions from domestic firewood use and attributes these to the forest sector. For the purposes of this report, harvest residues that might be used for domestic firewood are assumed to decompose in the forest.
- International greenhouse gas (GHG) reporting rules have changed with respect to harvested wood products. Accordingly, starting in 2015, Canada reports the net GHG balance of forested ecosystems and the net GHG balance from harvested wood products separately. In previous years, all wood removed from the forest was assumed to instantly release all carbon to the atmosphere, despite the long-term storage of carbon in houses and other long-lived wood products. This new reporting convention encourages both the sustainable management of forests and the management of harvested wood products aimed at extending carbon storage.
- Additional information can be found at:
    - Kurz, W.A., Shaw, C.H., et al. 2013. Carbon in Canada's boreal forest: A synthesis. *Environmental Reviews* 21, 260–292. http://cfs.nrcan.gc.ca/publications?id=35301
    - Lemprière, T.C., Kurz, W.A., et al. 2013. Canadian boreal forests and climate change mitigation. *Environmental Reviews* 21, 293–321. http://cfs.nrcan.gc.ca/publications?id=35627
    - Stinson, G., Kurz, W.A., et al. 2011. An inventory-based analysis of Canada's managed forest carbon dynamics, 1990 to 2008. *Global Change Biology* 17, 2227–2244. http://cfs.nrcan.gc.ca/publications?id=32135

Spotlight: Assisted migration as a climate change adaptation tool

Sources

- McKenney, D.W., Pedlar, J.H., et al. 2011. Revisiting projected shifts in the climate envelopes of North American trees using updated general circulation models. *Global Change Biology* 17, 2720–2730. http://cfs.nrcan.gc.ca/publications?id=32229
- McLachlan, J.S., Clark, J.S., et al. 2005. Molecular indicators of tree migration capacity under rapid climate change. *Ecology* 86, 2088–2098. http://onlinelibrary.wiley.com/doi/10.1890/04-1036/abstract
- McLachlan, J.S., Hellmann, J.J., et al. 2007. A framework for debate of assisted migration in an era of climate change. *Conservation Biology* 21, 297–302. http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2007.00676.x/abstract
- Pedlar, J., McKenney, D.W., et al. 2011. The implementation of assisted migration in Canadian forests. *Forestry Chronicle* 87, 766–777. http://cfs.nrcan.gc.ca/publications?id=33121
- Pedlar, J.H., McKenney, D.W., et al. 2012. Placing forestry in the assisted migration debate. *BioScience* 62, 835–842. http://cfs.nrcan.gc.ca/publications?id=34149
- Ricciardi, A., and Simberloff, D. 2009. Assisted colonization is not a viable conservation strategy. *Trends in ecology and evolution* 24, 248–253. http://www.sciencedirect.com/science/article/pii/S0169534709000767

How do forests benefit Canadians?

Sources

- Alliance for Community Trees. 2011. *Benefits of trees and urban forests: A research list.* http://www.actrees.org/files/Research/benefits_of_trees.pdf
- Health Canada. *Air pollution and health.* http://healthycanadians.gc.ca/healthy-living-vie-saine/environment-environnement/air/index-eng.php
- Health Canada. 2009 (revised 2010). The urban heat island effect: Causes, health impacts and mitigation strategies. *Climate Change and Health: Adaptation Bulletin* 1, 1–2. http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/adapt_bulletin-adapt1/index-eng.php
- Indigenous and Northern Affairs Canada, communities georeferenced by postal code.
- Statistics Canada. 2011 Census of Population.
- Statistics Canada. Labour Force Survey (special extraction).
- TD Economics. 2014. *Urban forests: The value of trees in the City of Toronto (special report).* https://www.td.com/document/PDF/economics/special/UrbanForests.pdf

Note

- Sources for the article *Helping Canada's urban forests adapt to climate change* on page 16:
    - TD Economics. 2014. Urban forests: *The value of trees in the City of Toronto (special report).* https://www.td.com/document/PDF/economics/special/UrbanForests.pdf
    - TD Economics. 2014. *The value of urban forests in cities across Canada (special report).* https://www.td.com/document/PDF/economics/special/UrbanForestsInCanadianCities.pdf

Indicator: Employment

Source

- Statistics Canada. CANSIM table 383-0031: Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3830031&paSer=&pattern=&stByVal=1&p1=1&p2=50&tabMode=dataTable&csid (June 17, 2016)

Notes

- Municipalities refer to Statistics Canada census subdivisions (CSD). http://www12.statcan.gc.ca/census-recensement/2011/ref/dict/geo012-eng.cfm
- The System of National Account (SNA) is the official source of employment data for Natural Resources Canada.

Indicator: Average earnings

Sources

- Council of Ontario Universities. 2014. *2013 Graduate Survey*. http://cou.on.ca/publications/reports/pdfs/2013-graduate-survey---final
- Statistics Canada. CANSIM table 281-0027: Survey of Employment, Payrolls and Hours (SEPH), average weekly earnings by type of employee overtime status and detailed North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2810027&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 21, 2016)
- Statistics Canada. CANSIM table 380-0102: Gross domestic product indexes. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3800102&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 21, 2016)

Notes

- Additional information can be found at:
    - Natural Resources Canada–Canadian Forest Service. 2013. Skilled trade shortages – a regional issue. *Selective Cuttings*. http://cfs.nrcan.gc.ca/selective-cuttings/12
    - Natural Resources Canada–Canadian Forest Service. Industry – Overview. http://www.nrcan.gc.ca/forests/industry/13311
- Data exclude overtime.

Indicator: Communities

Source

- Natural Resources Canada–Canadian Forest Service's calculations based on Statistics Canada, 2011 Census of Population and Labour Force Survey.

Notes

- This indicator establishes a standard against which to measure this aspect of the sector in future years. It is important to note that a decline in the indicator can reflect either a decline in the fortunes of the forest sector (e.g., if a mill closes, the income from the forest sector goes down) or an increase in diversification of the economy (e.g., no changes to the forest sector income, but other sources of income increase). As a result, an increasing or declining trend in the number of census subdivisions with the forest sector as a major economic driver will be hard to interpret in the absence of other information.

- A "forested area" is defined as an area with over 60% tree cover.
- All communities indicators are based on Statistics Canada's census subdivisions, which are defined as an "area that is a municipality or an area that is deemed to be equivalent to a municipality for statistical reporting purposes (e.g., as an Indian reserve or an unorganized territory)." Since there is no standardized definition of "community" across provinces and territories, adopting the use of census subdivisions ensures consistency in reporting over time.
- The forest sector is considered to be a major economic driver if it directly accounts for 20% or more of total income – excluding transfer income – in a census subdivision. This differs from the previous definition of forest dependence, which was predicated on having over 50% of total income – including transfer income – directly attributable to the forest sector.

Spotlight: Bioenergy in Indigenous communities

Sources

- Government of the Northwest Territories. *Northwest Territories Biomass Energy Strategy 2010*. http://www.enr.gov.nt.ca/programs/nwt-climate-change/biomass
- Government of the Northwest Territories. *Northwest Territories Biomass Energy Strategy 2012–2015*. http://www.enr.gov.nt.ca/sites/default/files/strategies/biomass_energy_strategy_2012-2015.pdf
- Indigenous and Northern Affairs Canada. Aboriginal Peoples and Communities, First Nation profiles. Registered population as of July, 2016. Whitesand. http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=190
- Natural Resources Canada. Remote communities database. Map of Canada by province and territory. https://www2.nrcan-rncan.gc.ca/eneene/sources/rcd-bce/index.cfm?fuseaction=admin.home1&new=true
- Yukon Government. 2016. *Yukon Biomass Energy Strategy*. http://www.energy.gov.yk.ca/pdf/Yukon-Biomass-Energy-Strategy-Feb2016.pdf

Note

- Natural Resources Canada has defined "off-grid communities" based on the 2013 report, *Status of Remote/Off-Grid Communities in Canada*, which states the following:

  > The terms "off-grid community" and "remote community" are used interchangeably within the context of this report for communities that fulfill the following criteria:
  >
  > 1. Any community not currently connected to the North-American electrical grid nor to the piped natural gas network; and
  > 2. Is a permanent or long-term (5 years or more) settlement with at least 10 dwellings.
  >
  > The North-American electrical grid is further defined in the Canadian context as any provincial grid under the jurisdiction of the North American Electric Reliability Corporation (NERC) and including the Newfoundland and Labrador main grid but excluding all territorial grids and provincial local grids.

How does the forest industry contribute to the economy?

Sources

- Statistics Canada. CANSIM table 383-0031: Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3830031&paSer=&pattern=&stByVal=1&p1=1&p2=50&tabMode=dataTable&csid (April 20, 2016)
- Statistics Canada. Merchandise trade data, monthly data (special extraction). (April 20, 2016)

- Natural Resources Canada–Canadian Forest Service's calculations based on Statistics Canada's table 379-0031: GDP in 2007 constant prices, and estimated industry price deflators.

Note

- The energy sector metrics exclude coal and uranium mining activities.

Indicator: Gross domestic product

Sources

- Natural Resources Canada–Canadian Forest Service's calculations based on Statistics Canada's table 379-0031: GDP in 2007 constant prices, and estimated industry price deflators.
- Statistics Canada. CANSIM table 379-0031: Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790031&paSer=&pattern=&stByVal=1&p1=1&p2=1&tabMode=dataTable&csid (April 21, 2016)
- Statistics Canada. Table 379-0029: Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790029&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 21, 2016)
- Statistics Canada. Table 379-0023: Gross domestic product (GDP) at basic price in current dollars, System of National Accounts (SNA) benchmark values, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790023&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 21, 2016)
- Statistics Canada. Table 379-0024: Gross domestic product (GDP) at basic price in current dollars, System of National Accounts (SNA) benchmark values, special industry aggregations based on the North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790024&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 21, 2016)

Notes

- CANSIM tables 379-0023 and 379-0024 were terminated and replaced by CANSIM table 379-0029.
- Data based on 2007 constant prices.

Indicator: Production

Sources

- APA – The Engineered Wood Association. Quarterly production reports.
- Food and Agriculture Organization of the United Nations, Statistics Division. http://faostat3.fao.org/download/F/FO/E (April 20, 2016)
- Pulp and Paper Products Council.
- Statistics Canada. CANSIM table 303-0064: Lumber production, shipments and stocks, by Canada and provinces. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3030064&paSer=&pattern=&stByVal=1&p1=1&p2=1&tabMode=dataTable&csid (April 20, 2016)

Note

- Data used for lumber production include total softwood production for Canada.

Indicator: Exports

Source

- Statistics Canada. Merchandise trade data. (April 20, 2016)

Note

- "Total all forest products" comprises only HS Codes 44, 47 and 48.

How is the forest industry changing?

Sources

- Natural Resources Canada. Comprehensive energy use database. http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive_tables/list.cfm (April 26, 2016)
- Statistics Canada. *Report on energy supply and demand in Canada (2014 preliminary)*. http://www.statcan.gc.ca/pub/57-003-x/57-003-x2016002-eng.htm (April 22, 2016)

Note

- Source for the article *5 reasons why wood is one of Canada's most valuable resources* on page 15:
    - Canadian Wood Council. 2010. *Energy and the Environment in Residential Construction*. Sustainable Building Series, 1. http://cwc.ca/wp-content/uploads/publications-Energy-and-the-Environment.pdf
- Additional information about Natural Resources Canada–Canadian Forest Service's Investments in Forest Industry Transformation program can be found at:
    - Natural Resources Canada–Canadian Forest Service. Investments in Forest Industry Transformation Program. http://www.nrcan.gc.ca/forests/federal-programs/13139

Indicator: Financial performance

Source

- Statistics Canada. Quarterly financial statistics for enterprises (61-008-X) (special extraction).

Indicator: Secondary manufacturing

Sources

- Industry Canada. Trade data online. (April 22, 2016)
- Statistics Canada. CANSIM table 301-0003: Annual survey of manufactures (ASM), principal statistics by North American Industry Classification System (NAICS), incorporated businesses with employees having sales of manufactured goods greater than or equal to $30,000. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3010003&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (April 22, 2016)
- Statistics Canada. CANSIM table 379-0031: Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790031&paSer=&pattern=&stByVal=1&p1=1&p2=1&tabMode=dataTable&csid (April 22, 2016)
- Statistics Canada. CANSIM table 304-0014: Manufacturers' sales, inventories, orders and inventory to sales ratios, by North American Industry Classification System (NAICS), Canada. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3040014&paSer=&pattern=&stByVal=1&p1=1&p2=50&tabMode=dataTable&csid (April 22, 2016)

Notes

- Data based on chained (2007) dollars.
- Industry Canada defines "value added" as a measure of net output – that is, of gross output less those purchased inputs that have been embodied in the value of the product.
- Domestic consumption is calculated as domestic sales minus exports plus imports.

Indicator: Forest industry carbon emissions

Sources

- Natural Resources Canada. Comprehensive energy use database. http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive_tables/list.cfm (April 26, 2016)
- Statistics Canada. *Report on energy supply and demand in Canada (2014 preliminary)*. http://www.statcan.gc.ca/pub/57-003-x/57-003-x2016002-eng.htm (April 22, 2016)

Note

- The methodology for estimating the amount of primary energy attributed to wood and spent pulping liquor in the pulp and paper manufacturing sub-sector was updated in 2015, causing changes in the data series between 1995 and 2002. In addition, from 1990 to 2010, wood waste and spent pulping liquor were incorrectly included in other fuels when estimating electricity generation in the *Report on Energy Supply and Demand in Canada*. This has now been corrected for the 2011, 2012 and 2013 data points, but will not be corrected for prior years. These changes have directly affected the estimates for industrial energy use and electricity generation, and indirectly affected the emissions estimates. The time series data for 1990–2013 may therefore not be completely consistent with data for earlier years.

Statistical profiles

Forest inventory

Sources

Forest area by classification

- National Forest Inventory. Standard reports, Table 4.0, Area (1000 ha) of forest and non-forest land in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T4_FOR_AREA_en.html (May 13, 2016)

Forest area change

- Environment and Climate Change Canada. 2016. *National Inventory Report 1990–2014: Greenhouse gas sources and sinks in Canada*. https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=662F9C56-1

Forest type

- National Forest Inventory. Standard reports, Table 5.0 Area (1000 ha) of forest land by forest type and age class in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T5_FORAGE20_AREA_en.html (May 13, 2016)

Forest ownership

- National Forest Inventory. Standard reports, Table 12.0 Area (1000 ha) of forest land by ownership in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T12_FOROWN_AREA_en.html (May 13, 2016)

Growing stock

- National Forest Inventory. Standard reports, Table 15.0 and 16.0, Total tree volume (million m^3) on forest type and age class in Canada, and Total tree volume (million m^3) by species group and age class in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T15_FORAGE20_VOL_en.html and https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T16_LSAGE20_VOL_en.html (April 8, 2016)

Notes

- *Forest area change* – Environment and Climate Change Canada's *National Inventory Report 1990–2014* uses Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- *Forest area by classification* – The National Forest Inventory uses the following definitions from the Food and Agriculture Organization of the United Nations (FAO):
    - *Forest land* – land spanning more than 0.5 hectares where the tree canopy covers more than 10% of the total land area and the trees can grow to a height of more than 5 metres. It does not include land that is predominantly urban or used for agricultural purposes. "*Forest*" may often be treated as synonymous with "forest land" because forest is defined both by the presence of trees and by the absence of non-forest land use.
    - *Other land with tree cover* – areas of land where tree canopies cover more than 10% of the total area and the trees, when mature, can grow to a height of at least 5 metres. Includes treed areas on farms, in parks and gardens, and around buildings. Also includes tree plantations established mainly for purposes other than wood production, such as fruit orchards.
    - *Other wooded land* – areas of land where: 1) tree canopies cover 5% – 10% of the total area and the trees, when mature, can grow to a height above 5 metres; or 2) shrubs, bushes and trees together cover more than 10% of the area. These areas include treed wetlands (swamps) and land with slow-growing and scattered trees. They do not include land that is predominantly agricultural or urban.
    - The base estimate of forest area for Canada comes from the National Forest Inventory baseline report, available at https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T4_FOR_AREA_en.html
    - The estimate of current forest area (2015) was calculated by taking the National Forest Inventory baseline estimate at the source above and adjusting it for known increases in forest area (afforestation) and known decreases in forest area (deforestation) that occurred during the time since baseline data were collected. These adjustments are described in Canada's 2015 country report to the United Nations Food and Agriculture Organization, available at http://www.fao.org/forest-resources-assessment/current-assessment/country-reports/en/

Disturbance

Sources

Insects

- National Forestry Database. Forest insects – National tables, Table 4.1, Area within which moderate to severe defoliation occurs including area of beetle-killed trees by insects and province/territory, 1975–2015. http://nfdp.ccfm.org/data/compendium/html/comp_41e.html **(June 29, 2016)**

Fire

- Canadian Interagency Forest Fire Centre. 2015. *Canada Report 2015*. http://www.ciffc.ca/images/stories/docs/2015%20canada%20report.pdf **(June 23, 2016)**

Notes

- *Insects* – Data include those areas where there is tree mortality and moderate to severe defoliation. Defoliation does not always imply mortality. For example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one species at a time. This may result in double or triple counting in areas affected by more than one species, exaggerating the extent of the total area defoliated.
- *Fire* – National data include all burned areas within Canada's forests. Provincial data do not include fires within national parks. In 2015, 84 fires burned 282,131 hectares in national parks across Canada.

Forest management

Sources

Harvesting

- National Forestry Database. Silviculture – National tables, Table 6.1, Silvicultural statistics by province/territory 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_61e.html (June 29, 2016)
- National Forestry Database. Forest products – National tables, Table 5.1, Net merchantable volume of roundwood harvested by category, ownership and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_51e.html (June 29, 2016)

Regeneration

- National Forestry Database. Silviculture – National tables, Table 6.6, Area of direct seeding by ownership and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_66e.html (June 29, 2016)
- National Forestry Database. Silviculture – National tables, Table 6.7, Area planted by ownership, species and province/territory, 1990–2015. http://nfdp.ccfm.org/data/compendium/html/comp_67e.html (June 29, 2016)

Third-party certification

- Certification Canada. *Canadian statistics*. http://certificationcanada.org/en/statistics/canadian-statistics/

Protected forest

- National Forest Inventory. Standard reports, Table 9.0 Area (1000 ha) of forest land by IUCN category and age class in Canada. https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T9_PSAGE20_AREA_en.html (May 13, 2016)

Notes

- *Harvesting* – The national and provincial/territorial figures for harvesting volume include data for industrial roundwood, fuel wood and firewood.
- *Area planted and seeded* – The total area planted and seeded for Canada includes all federal, provincial and territorial Crown land, and private land.
- *Third-party certification* – If a forest area has been certified to more than one of the three sustainable forest management standards (Canadian Standards Association [CSA], Sustainable Forestry Initiative [SFI], and Forest Stewardship Council [FSC]), the area is counted only once. Therefore, the total certification for sustainable forest management standards may be less than the sum of the individual totals for these standards. The independently certified forest area is calculated using Forest Management Units (FMUs), which include streams, lakes, rivers and roads.

Greenhouse gas inventory

Source

- Environment and Climate Change Canada. 2016. *National Inventory Report 1990–2014: Greenhouse gas sources and sinks in Canada*. https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=662F9C56-1

Notes

- Environment and Climate Change Canada's *National Inventory Report 1990–2014* uses Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- For forest lands affected by land-use change, the deforestation and afforestation figures reflect annual rates. Figures for CO_2 equivalent (CO_2e) emissions and removals reflect the current year plus the previous 20 years. Thus, the figures for CO_2e emissions include residual emissions from areas deforested over the past 20 years, and the figures for CO_2e removals include ongoing removals by areas afforested over the past 20 years.

- Emissions and removals exactly match the most recent greenhouse gas inventory figures submitted to the United Nations Framework Convention on Climate Change. Emissions bear a positive sign. Removals bear a negative sign.

- The 2013 figure for total emissions due to deforestation reported in the 2015 edition of the State of Canada's Forests should have been 11.1 megatonnes of CO_2e instead of 3.1 megatonnes, which represented only direct emissions.

Domestic economic impact

Sources

Canadian housing starts

- Statistics Canada. CANSIM table 027-0009: Canada Mortgage and Housing Corporation, housing starts, under construction and completions, all areas. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0270009&paSer=&pattern=&stByVal=1&p1=1&p2=1&tabMode=dataTable&csid (March 16, 2016)

Contribution to nominal GDP

- Natural Resources Canada–Canadian Forest Service's calculations based on Statistics Canada's CANSIM table 379-0031: Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS)

Contribution to real GDP

- Statistics Canada. CANSIM table 379-0031: Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790031&paSer=&pattern=&stByVal=1&p1=1&p2=1&tabMode=dataTable&csid (May 30, 2016)

Revenue from goods manufactured

- Statistics Canada. CANSIM table 301-0008: Principal statistics for manufacturing industries, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3010008&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 29, 2016)
- Statistics Canada. CANSIM table 301-0009: Logging industries, principal statistics by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3010009&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 29, 2016)

Notes

- *Canadian housing starts* – A rate adjustment is used for economic or business data that attempts to remove seasonal variations in the data. The time of year will affect most data. Adjusting for the seasonality in data enables more accurate month-to-month comparisons. The seasonally adjusted annual rate (SAAR) is calculated by dividing the unadjusted annual rate for the month by its seasonality factor and creating an adjusted annual rate for the month. These adjustments are more often used when economic data are released to the public.
- *Contribution to GDP* – a measure of the economic production that takes place within the geographical boundaries of Canada. Nominal GDP is measured in current dollars and is available only for Canada. Current dollars are used to describe the value of production in any given year. Real GDP is measured in 2007 dollars and corrects for inflation, enabling accurate comparisons between years.
- *Revenue from goods manufactured* – includes revenue from the sale of goods manufactured using materials owned by the establishment, as well as from repair work, manufacturing service charges and work contracted to others.

Forest industry employment

Sources

Employment

- Statistics Canada. Labour Force Survey (special extraction).
- Statistics Canada. CANSIM table 281-0024: Survey of Employment, Payrolls and Hours (SEPH), employment by type of employee and detailed North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2810024&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 31, 2016)
- Statistics Canada. CANSIM table 383-0031: Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3830031&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (June 17, 2016)
- Indirect employment is calculated by Natural Resources Canada using Statistics Canada's National Symmetric Input-Output Tables (15-207-XCB) and Statistics Canada's National Multipliers (15F0046XDB).

Wages and salaries

- Statistics Canada. CANSIM table 301-0008: Principal statistics for manufacturing industries, by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3010008&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 30, 2016)
- Statistics Canada. CANSIM table 301-0009: Logging industries, principal statistics by North American Industry Classification System (NAICS). http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3010009&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 30, 2016)

Notes

- *Employment* – includes jobs held by people employed directly in the following industries: forestry and logging; industries involved in support activities for forestry; pulp and paper product manufacturing; and wood product manufacturing. Data are sourced from Statistics Canada's Labour Force Survey (LFS) and the Survey of Employment, Payrolls and Hours (SEPH). The LFS data are used to capture the level of self-employment in the forest sector. The SEPH data are used for comparing direct employment in forestry with that in other sectors. The System of National Accounts (SNA) is used by Statistics Canada to assemble all of the relevant data on the Canadian economy into a consistent set of metrics.
- *Wages and salaries* – the earnings, in cash or in kind, of Canadian residents for work performed before deduction of income taxes and contributions to pension funds, employment insurance and other social insurance schemes.

Trade

Source

- Statistics Canada. Merchandise trade data (special extraction), monthly data.

Note

- *Balance of trade* – the difference between the value of the goods and services that a country exports domestically and the value of the goods and services that it imports. If a country's exports exceed its imports, it has a trade surplus. If its imports exceed exports, the country has a trade deficit.

Domestic production and investment

Sources

Production

- Statistics Canada. CANSIM table 303-0064: Lumber production, shipments and stocks, by Canada and provinces. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3030064&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (March 7, 2016)
- Pulp and Paper Products Council.
- APA – The Engineered Wood Association.

Capital expenditures and repair expenditures

- Statistics Canada. CANSIM table 029-0045: Capital and repair expenditures, by North American Industry Classification System (NAICS), Canada, provinces and territories. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0290045&&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid (July 18, 2016)

Notes

- *Production* – Production and consumption figures for newsprint, printing and writing paper, and wood pulp are based on Pulp and Paper Products Council data. The production and consumption data of structural panels (plywood and oriented strand board) are from APA – The Engineered Wood Association.
- *Capital expenditures* – includes the costs of procuring, constructing and installing or leasing new durable plants, machinery and equipment, whether for the replacement of or addition to existing assets. Also included are all capitalized costs, such as costs for feasibility studies and architectural, legal, installation and engineering fees; the value of capital assets put in place by firms, either by contract or with the firm's own labour force; and capitalized interest charges on loans for capital projects.
- *Repair expenditures* – includes costs to repair and maintain structures, machinery and equipment.

Domestic consumption

Source

- Consumption figures for a range of products, calculated by Natural Resources Canada.

Note

- This information is available only at the national level.